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THERMAL ADJUSTMENT OF MAN AND ANIMALS TO EXTERNAL CONDITIONS.*

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DIRECTOR OF THE LISTER INSTITUTE OF PREVENTIVE MEDICINE; PROFESSOR OF EXPERIMENTAL PATHOLOGY IN THE UNIVERSITY OF LONDON.

LECTURE I.

In these lectures I shall deal more particularly with the conditions pertaining to warm climates. No attempt will be made to give an equitable review of the present knowledge of thermal adjustment or to catalogue the immense number of researches which have accumulated during recent years. After a preliminary survey of the mechanisms of thermotaxis I shall deal more particularly with some fragments of the subject which have particularly interested me for upwards of 30 years, and to the understanding of which some small contributions have been made by my laboratory comrades and myself.

Homœothermism signifies a measure of superiority to environment, and the development of this faculty has played an important part in the history of animal life. When animals emerged from the sea they became the victims of great and comparatively sudden changes in temperature, for the rate of physiological processes, like that of the chemical processes underlying them, is influenced by temperature and to somewhat the same degree. Accordingly, unless an animal can control its temperature all its activities must rise or fall with the temperature of its environment.

The information available on the effect of temperature upon various physiological activities was analysed by Snyder (1908). It has also been collected by Kanitz (1915 and 1925). The rate of muscular contraction and the velocity of nervous impulses, the heart-beat, and many other bodily functions are increased two or three times for a 10° C. rise. The influence of the temperature upon combustion in the tissues of both cold-blooded and warm-blooded animals has been extensively studied, for oxygen consumption integrates the whole cellular activities of the animal and is convenient to measure. Unfortunately, comparatively few of these experiments have been made under standard conditions. Amongst the most regular of these results, because disturbing conditions (e.g., movements) were minimised, are those by Krogh (1916). Krogh's observations cover a range of 8–28° C. with cold-blooded creatures and 14–28° C. with the dog. He found in all cases about 10 per cent. rise per degree Centigrade. This, at compound interest, amounts to 2·5 times for 10° and 18 times the rate for 30° difference, a by no means unusual variation in atmospheric temperature. Krogh found, however, that the increase is not so uniformly progressive as the logarithmic law for chemical action implies, the rate of increase being greater at the lower temperatures. By establishing a temperature around 40° which, from the materials of which animals are constructed, provides the maximum activity attainable, the homœothermic animal achieved an immense advantage over its poikilothermic contemporaries. Whenever the surrounding temperature fell it could escape its cold-blooded enemies and catch its cold-blooded prey. This advantage is bought at the expense of fuel. The cost of bare existence of a lizard at 15°–20° is only about 2½ per cent. of that of a man reckoned for the same surface. Martin (1902.)

The economy of reptiles is indeed amazing. I was once called in consultation to see a python whose state of health was causing some uneasiness to its proprietors. It had not eaten for three years. As far as I could ascertain the only symptom was anorexia. I ordered forcible feeding and it was suggested that I should assist with the treatment. The creature proved to be so vigorous that we were unable to accomplish our object until we had cooled the animal with ice to 5° C., when we gave it 20 lb. of beef steak by means of a long pair of metallurgical tongs. Next day, when it warmed up, it defeated our efforts by regurgitating the meat. On inquiry a year later I heard that it had recently died of some intercurrent infection.

Mechanism of Homœothermism.

To keep a system at constant temperature throughout, any change of heat loss must be balanced by a corresponding change in heat production or vice versa. This necessitates a sensitive self-acting mechanism set to a particular temperature and capable of controlling either the rate of heat production or heat loss, or both. A regulator on the principle used in a thermostat, which turns on more heat if the temperature falls and turns it off if the temperature rises, would be the simplest mechanism and, if sufficiently sensitive, would work as long as the temperature of the body was considerably above its environment. But, as the environmental temperature approached that of the body, this mechanism would be inadequate to maintain a homœothermic state, for in an animal heat production cannot be reduced below a minimum consistent with life, and this minimum is multiplied five to ten times with strenuous work.

On the other hand, a regulating mechanism operating upon rate of loss alone would be very costly in fuel and thereby limit the range of external temperature within which a constant internal temperature could be maintained, and we find that higher mammals have achieved a compromise; they use both methods of regulation and different sorts employ them to varying degrees. Man, in his nakedness and the wide area over which he can sweat, is the best adapted of all creatures to withstand high external temperatures and, coincident with his loss of hair, his increasing intelligence has allowed him to extend the downward range of external temperature at which he could remain homœothermic by providing himself with adjustable insulation.

THE DIFFERENT MEANS OF HEAT LOSS AND THE PROPORTION DISPERSED BY EACH UNDER DIFFERENT CIRCUMSTANCES.

Heat is produced by combustion in the cells of the body. It is lost by radiation, convection, and evaporation. Apart from voluntary modification of his surface by posture and of his insulation, heat loss in man depends upon the temperature of his skin and the rate at which water is evaporated from

*The Croonian Lectures delivered before the Royal College of Physicians of London on June 12th, 17th, and 19th.

it. These in any given atmospheric conditions are determined by the volume of blood circulating through the skin in unit time and by the activity of his sweat glands. Animals also voluntarily control loss of heat by posture and involuntarily by varying the thickness of their fur through erecting the constituent hairs, but in man "goose flesh" is an almost functionless vestige of this useful protective reaction. The proportion of heat lost by radiation, convection, and evaporation is determined by the temperature of the surroundings, the moisture in the air, and wind. It was estimated by Rubner (1896) that a man comfortably clothed and sedentary in a room at 15° C., the air of which is 50 per cent. saturated with moisture, loses 44 per cent. of his total heat dissipation by radiation, 31 per cent. by convection, and 20 per cent. by evaporation from lungs and skin. Aldrich (1928), by more modern methods, arrives at much the same conclusions. The proportion is very different if the surrounding temperature approaches or exceeds the temperature of the skin and if the sun shines upon him. Under these conditions loss by radiation and convection are minimised or heat transference by them reversed. Only evaporation is available.

A man even at rest produces about 1·2 large calories per minute, so he must, under these atmospheric conditions, evaporate at least 2 c.cm. of water per minute (each gramme of water evaporated absorbs 585 small calories) or 120 c.cm. per hour, even under the most advantageous circumstances for deriving all the heat required for evaporation from the body. With fairly strenuous work the heat produced will rise to five or six large calories, requiring a minimum of 600 c.cm. (approximately a pint) to be evaporated per hour, or his body temperature must rise. If he has to work in the sun and surrounded by objects hotter than his body, he will require to evaporate considerbly more, possibly twice as much. Hunt (1913) states that when doing survey work in India, with a shade temperature varying between 100° and 110° F., and walking about three miles per hour in the sun the minimum consumption of water per day was 3 gallons (30 lb.). I found great difficulty in impressing this simple arithmetical calculation upon military authorities during some of our desert campaigning in the summer of 1916.

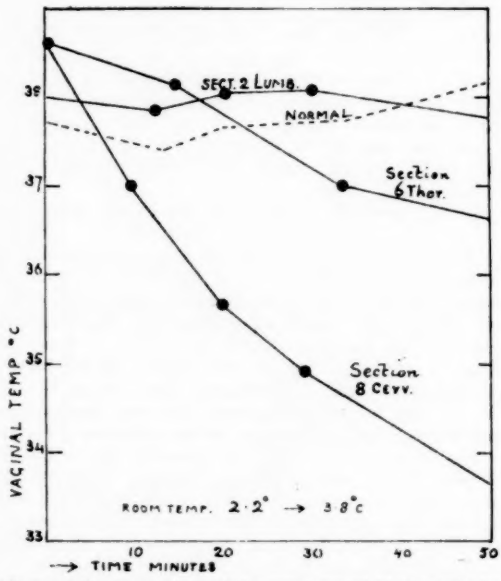
Nervous Mechanism of Thermotaxis.

This consists of afferent neurons with special terminations in the skin which are sensitive to temperature, efferent neurons activating various mechanisms whereby heat loss or heat production is varied and a central coördinating machinery. The afferent nerves subserving temperature sensations enter the cord by the posterior roots and, after crossing, ascend in the antero-lateral columns. They have been traced to the posterior part of the optic thalami. The efferent nerves concerned in modifying heat loss are the nerves to the vessels of the skin, to the sweat glands, and to the erector muscles of the hairs. The outflow of nerve-fibres from the cord to the sweat glands and *arrectores pilorum* closely follows the sympathetic distribution of the vasomotor nerves to the skin. The nerve paths along which impulses pass which modify heat production are extensive, and include the nerve-supply to the musculature and all the active tissues of the body, including the endocrine glands.

That heat production in muscles is under nervous control otherwise than through the motor nerves is held by Mansfield and Lukàcs (1915), because they found that in curarised animals section of motor nerves caused a fall in oxygen consumption. Freund and Jansson (1923) also concluded, from their experiments on animals in which the motor nerves were cut and the oxygen consumption of the muscles of the leg was measured on both sides and on one side the arteries were stripped of nerve-fibrils, that sympathetic fibres control heat production in voluntary muscle. Newton (1924), however, could find no evidence for this conclusion. Mansfield and Lukàcs and Freund and Jansson take for granted that a separate sympathetic innervation of voluntary muscle has been established anatomically, but this, too, is now by no means generally accepted.

The situation of the central coördinating mechanism has been approximately defined in some of the lower animals by removing or severing successive portions of the central nervous system from below upwards and from above downwards, supplemented by destroying limited areas of the brain and subsequently observing to what extent and in what manner thermotaxis was impaired. Many such experiments have been vitiated by anæsthetics or complicated by shock or irritation, and it is only from those in which the animal had completely recovered from the operation at the time the observations were made that conclusions can be safely drawn. The early observations of Pfluger (1878) on the condition of a dog after

FIG. 1.



Influence of sojourn at an air temperature of 3° C. on the body temperature of normal bitch and bitches with section of the cord at different levels made some months previously. Sherrington (1924).

section of the cord at the sixth cervical vertebra, and many observations on man after lesions in this region indicated that coördination was performed by some portion of the nervous system above this level. Kennaway and Pembrey (1912) studied the thermotactic ability and the respiratory exchange in mice and rabbits before and after severing the cord just below the brachial plexus. The section obliterated the regulation of heat loss from the paralysed portion, but a considerable amount of control over heat production remained. The animals' consumption of oxygen was increased in their efforts to compensate

for the greater loss of heat, and the authors assume that all this increased combustion was accomplished in muscles of the portion of the body anterior to the section.

More precise information of the effect of section of the cord at different levels upon the ability of an animal to control its temperature has been afforded by the experiments of Freund and Strassmann (1912) and Freund and Grafe (1912) on rabbits, and those of Sherrington (1924) upon dogs.

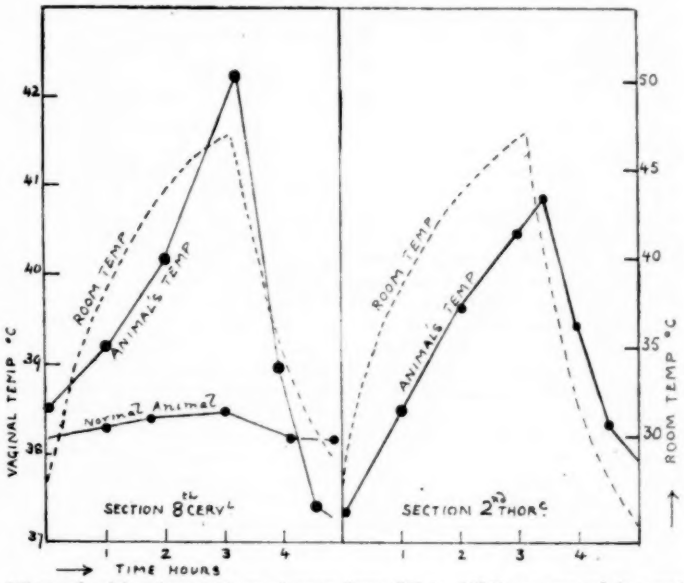
Sherrington's experiments are particularly convincing as he had at his disposal animals in which spinal sections had been made from one month to one and a half years previously. The dogs were in good health but had to be kept in a room at 26° C. in order to maintain a body temperature of 37° C. Figs. 1 and 2 illustrate the effect of sections of the cord at different levels upon the animals' power to accommodate when their surroundings were cooled or heated. Observations upon normal dogs are included for comparison. The normal dog, when the temperature of the air was 2° C., coiled himself up to reduce his surface, roughened his coat to improve his insulation, diverted his blood flow from the surface, until his nose and extremities were cold to the touch, and shivered occasionally to increase his heat production; by these means he maintained his body temperature. The paraplegic dogs could only do all these things over a proportion of their body, diminishing as the level of the cord-section was higher. They were progressively handicapped by the greater extent of their paraplegic and poikilothermic portion, and their body temperature fell more or less rapidly. Gardiner and Pembrey (1911) have collected an interesting series of cases of traumatic section of the cord in man which illustrate the same fact.

In some further experiments Sherrington established that both shivering and the erection of hairs require a præspinal nervous apparatus, and that this can be stimulated by lowering the temperature of the blood, even when the remaining sentient surface of the skin is above its usual temperature. The converse holds for sweating, which occurs on stimulation of præspinal centres even when the surface is cold. This does not imply that either sweating or shivering are only produced by changing the temperature of the blood.

Sherrington's experiments did not include observations on the respiratory exchange and, apart from the elimination of shivering, afford no information as to how far nervous control of production is handicapped by spinal section. This was done by Kennaway and Pembrey (1912), and has more recently been the object of experiments by Freund and Grafe (1912). They agree with Pembrey and Kennaway that, in the rabbit, dorsal section by no means eliminates chemical regulation. They found that afterwards the rabbit consumes 30 per cent. more oxygen than before at the same temperature. This must be so if it is to maintain the same body temperature, for the heat loss from the paraplegic portion cannot be controlled.

The interest of their results resides in the discovery that if the section be made at the seventh cervical instead of at the second dorsal, or if after section at the second dorsal the cervical nerves are severed or the stellate ganglion removed, the animal behaves almost like a poikilothermic creature. By either of these procedures they will nearly have eliminated physical regulation from the whole of the body, but this does not account for their finding that afterwards the animal is not able to increase heat production, for the extra amount of musculature eliminated is not great. They are of opinion that between the level of the seventh cervical and second dorsal segments nerve-fibres emerge which pass into the sympathetic and are distributed to the liver and other glandular organs. That the thyroid was one such was an obvious inference, but they discard this interpretation as they found no further impairment of chemical regulation in a dog with dorsal section after thyroidectomy.

FIG. 2.



Effect of raising temperature of room from 26° to 46° C. on normal dog and bitches with section of the cord at eighth cervical or second thoracic level. Sherrington (1924).

Later Freund (1914), and also Plaut (1922), dissected away the nerves from the hepatic artery in dogs in which a dorsal section had been made. By this procedure the animals' capacity to increase heat production when cooled was further impaired, and they conclude that the suggested outflow into the sympathetic between the lower cervical and upper dorsal finds its way to the liver either with the vagus or along the vessels. This would indicate an unexpected origin and course, and the whole matter is far from clear.

Freund and Janssen's (1923) recent conclusions that nerve-fibres which leave the cord in the cervical region, join the sympathetic chain, and ultimately find their way along the artery to the muscles of the hind leg and control the combustion in these muscles, independently of the motor nerves, is difficult to accept. The experimental procedures upon which this "proof" was founded were very difficult and the protocols indicate that the errors of observation were great.

LOCATION OF A THERMOTACTIC "CENTRE" BY SUCCESSIVE ABLATIONS OF THE ANTERIOR END OF THE CENTRAL NERVOUS SYSTEM.

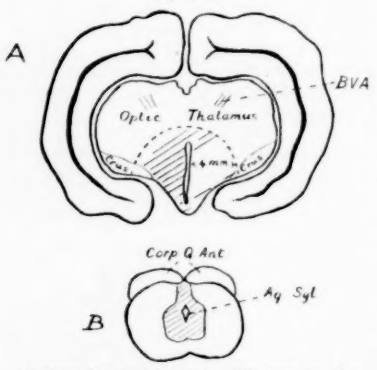
Goltz's famous dog, from which he removed the cerebral hemispheres and a good part of the *corpora striata* and optic thalami, lived 18 months and regulated its temperature. On the other hand, the usual method of decerebrating a dog or cat by passing a spatula along the tentorium to the base of the skull obliterates all trace of regulation. A decerebrate cat has been kept alive for five months by de Barenne (1919)

and one month by Bazett and Penfield (1922). These remnants of animals were poikilothermic and had to be kept in a room about 30° C. to maintain a body temperature of 40°. These observations limit the position of the central coördinating mechanism anteriorly to the region of the interbrain.

More precise localisation in the rabbit has been achieved by Isenschmid and his colleagues Krehl and Schnitzler (1912, 1914) (Figs 3, 4). By ablations and sections on a series of animals and by ascertaining in those that had completely recovered from the operations to what extent thermoregulation was affected, they found: (1) that removal of the cerebral hemispheres and *corpora striata* left regulation largely intact; (2) that when the section passed behind the optic thalami and between it and the *corpora quadrageminа* the animals became poikilothermic. Having delimited the position of the essential structures to this extent, by making a series of transverse lesions in this region, they arrived at the conclusion that the essential focus of nervous connexions is situated at the base and sides of the third ventricle, extending from the infundibulum anteriorly to just in front of the mammillary bodies posteriorly, with a lateral extent of about 3 mm. on each side of the third ventricle. The dotted lines A and B to the right of Fig. 4 represent, diagrammatically, the position of Isenschmid's sections; and the hatched area in transverse section A (Fig. 3), the minimum amount of destruction required to eliminate all trace of regulatory capacity. Section B (Fig. 3) shows what an extensive lesion is necessary to intercept connexions between this area in the *tuber cinereum* and the brain stem.

The total volume of this highly important portion of the brain which is involved in Isenschmid's lesion amounts, I reckon, to about 0·1 c.cm. It is a region which has been shown by Hasama (1929) to be in connexion indirectly with several sympathetic outflows—e.g., vasomotor, pilomotor, pupilodilator, cardiac augmentors, and sweat glands. The afferent connexions of this nervous exchange are multitudinous. It is in connexion, through the optic thalami, with the nerves of temperature sense from the whole surface of the body and with many other sensory nerves too, for pain and cayenne pepper produce sweating. Also it must have connexions with the higher centres, for Gessler and Hansen (1927) find that in a hypnotised person the suggestion of coldness may produce vasocontraction in the skin, goose-flesh and shivering in a warm room, and that the suggestion that the patient will not feel cold may inhibit these manifestations when the rate of heat loss is sufficient to occasion a fall in body temperature.

FIG. 3.



Section just behind infundibulum in the rabbit. Hatched area is that required to abolish thermoregulation. (Isenschmid and Schnitzler: Arch. f. Exp. Path., 1914, lxxvi., 202.) B is 4 mm. below section A ventrally and 8 mm. below section A dorsally. Destruction of hatched area did not greatly impair thermoregulation. B.V.A. = Bundle of Vicq d'Azyr.

SENSITIVITY OF DIFFERENT PORTIONS OF THE THERMOTACTIC NERVOUS APPARATUS TO TEMPERATURE.

The peripheral endings of the nerves of temperature sense are not the only part of the nervous system which is sensitive to temperature. Kahn (1904) showed that warming the blood-supply to the brain by surrounding the carotid artery of a dog with a jacket of warm water produced acceleration of the heart-beat, dilatation of the peripheral vessels, and secretion of sweat. His experiments were open to criticism on technical grounds, as he did not cool the blood returning from the brain. They were repeated by Moorhouse (1911), with attention to this and other possible sources of error, but similar results were obtained. By using a plethysmograph Moorhouse showed that the volume of a limb was very sensitive to small increases in temperature of the blood supplying the brain, and that these increases were observed before the augmentor action on the heart.

FIG. 4.

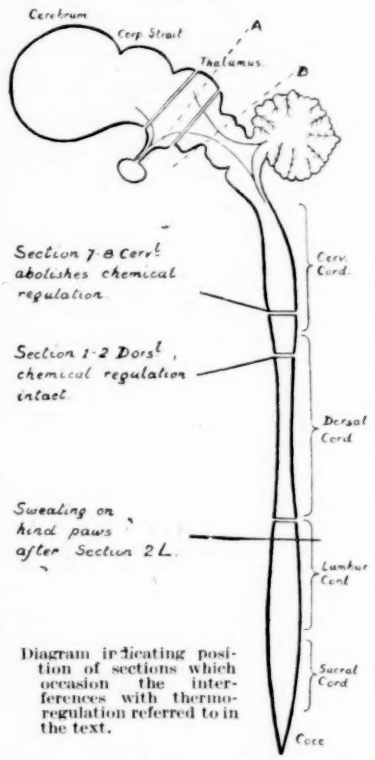


Diagram indicating position of sections which occasion the interferences with thermoregulation referred to in the text.

That the thermotactic apparatus at the base of the brain is sensitive to temperature and responds so as to regulate both heat production and heat loss was most satisfactorily demonstrated by Barbour (1912), who introduced a double cannula through a trephine opening in the skull of a rabbit down to the base of the lateral ventricle. The operation was performed aseptically and, by an ingenious technique, the cannula could be left in situ and the animal allowed to recover from the anæsthetic and the initial disturbance. When cold water was circulated through the cannula, vasoconstriction of the vessels of the ear was obvious, the oxygen consumption increased (Barbour and Prince (1914), and shivering occurred, although the body temperature of the animal was above normal. On the other hand, the circulation of water a few degrees above that of the body gave rise to flushing of the skin and diminished the oxygen consumption.

The significance of Barbour's experiments has been belittled because he found it necessary to use water 5° C. above or below the temperature of the brain in order to produce the effects. That criticism appears to me unjust. The end of his double cannula was only somewhere in the neighbourhood of the sensitive nerve-cells of the thermotactic centre subsequently

delimited by Isenschmid, and generally in the lateral ventricle. It was surrounded by brain tissue through which blood was circulating. In 1914 I repeated Barbour's experiments, but not always successfully. I obviously did not always hit the right spot. I found that his double cannula destroyed too much brain tissue, and I was more successful with a fine elastic catheter with a solid silver tip enclosing a fine metal inflow tube about 1 mm. bore. In the following year Hashimoto (1915) also repeated Barbour's experiments, but used a double cannula on both sides of the brain. Under these conditions it was not required to employ water so hot or so cold as Barbour found necessary to obtain his effects. With this bilateral arrangement Hashimoto could cool one side and heat the other, and then sometimes produced constriction of the vessels in one ear and dilatation in the other. Barbour's observations were confirmed for the cat by Prince and Hahn (1918). By placing a hind leg in a plethysmograph they were able to show that the volume of the leg increased or diminished according to whether the base of the brain was heated or cooled. This did not occur after removal of the skin, indicating that the vascular response was confined to the superficial vessels.

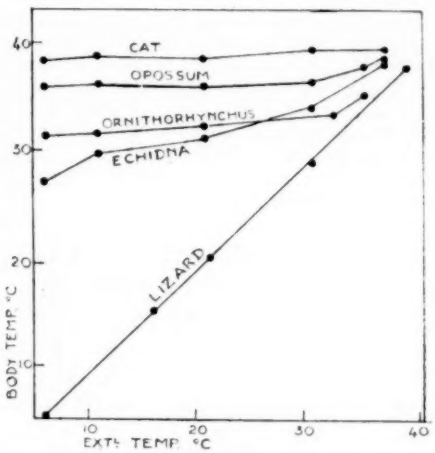
So far I have emphasised the proofs that the central mechanism of thermoregulation is itself sensitive to temperature, and so organised that it discharges impulses through appropriate nerve channels according to whether its temperature rises above or falls below a predetermined level. The mechanism is, however, more elaborate than this. Instead of waiting for the blood temperature to rise or fall, and meanwhile wasting calories, adjustment can be brought about reflexly from the surface. The centre is in connexion with the nerves of temperature sense from the skin, and responds with rapidity by efferent impulses which modify heat loss from the surface or, maybe, by others which result in an increased or diminished production of heat. It has been suggested that such coördinated reflexes could themselves achieve homœothermism, and the importance of the fact that the central nervous machinery is also directly sensitive to temperature is minimised by some physiologists. Consideration will, however, show that direct sensitivity of the centre is essential. A reflex mechanism to diminish heat loss and increase production when the skin cools would work progressively and the temperature inside would rise. In fact, a rigor would occur. The reverse would happen if vasodilatation in the skin occurred in response to warmth. The skin would become progressively warmer and the body temperature fall.

There must be some mechanism to control these reflexes as soon as they have accomplished their purpose, and I suggest that it is the direct influence of the slightly warmed or cooled blood reducing the sensitivity of the appropriate parts of the central apparatus to stimulation by impulses arriving by one path or another.

The conception of the central nervous mechanism for thermoregulation which best interprets physiological, pathological, and pharmacological observations and experiments is a slight elaboration of one put forth by Hans Meyer (1913). Meyer regards the thermotactic nervous apparatus in the *tuber cinereum* to be composed of two coupled nerve centres analogous to the inspiratory and expiratory centres for respiration. One of these he calls the thermogenic, the other the thermolytic centre. Each is sensitive to appropriate, direct, and reflex stimulation, their different connexions being such that antagonistic results follow. Meyer supposes that stimuli activating the thermolytic centre at the same time inhibit the thermogenic, and vice versa. The thermogenic centre must, however, be associated with yet a third collection of nerve-cells, impulses emanating from which occasion a sparing of heat loss by constricting superficial vessels and erecting hairs, for the first and sometimes the only response to impulses along nerves from "cold spots" on the skin is to economise heat loss in this way. For this piece of nervous apparatus I suggest the term thermopheidic centre ($\phi\epsilon\iota\delta\omega$ = thrift).

In this survey I have not yet exhausted the means available to an animal for temperature adaptation. Both thyroxin and adrenalin are calorigenic. The

FIG. 5.



Variation of body temperature of different types of animals by sojourn for two hours in an environment of 5° to 35° C.

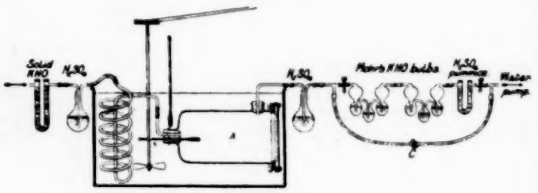
former is slow in action but the effect is prolonged. W. Cramer (1916, 1918, and 1919) has demonstrated by his histochemical method that both the suprarenals and the thyroid are stimulated by cold to excessive activity. This has been confirmed for the former by the Hartmans (1923) and more recently by the convincing experiments of Cannon and Querido (1924), and for the latter by Mills (1918) and Hart (1922) from histological changes in the gland. Boldyreff (1913) showed that a dog after thyroidectomy, was handicapped in protecting itself against cold, and the same disability was demonstrated by Kovenchewsky (1926) in rabbits. The importance of this indirect humoral method of regulating heat-production is championed by Cramer (1916), Meyer (1920), Aub, Forman, and Bright (1922), and Cannon (1925).

History of Homœothermy.

It may be safely assumed that the present perfection of thermal adjustment possessed by the higher mammals was acquired gradually, but most of the types of animals which may have possessed the faculty in a rudimentary form have disappeared from the face of the earth. There are, however, in Australia two interesting creatures with many characteristics intermediate between mammals and reptiles. I refer to the monotremes, which have a cloaca, lay eggs, and suckle their young. It seemed to me that an examination of their thermotactic capabilities might be interesting, and when in Melbourne I made some experiments with this object (Martin 1902). Both the monotremes have temperatures considerably lower than mammals. The duck-billed platy

Ornithorynchus paradoxus, maintains a fairly constant temperature provided it is not too hard put to do it, but the ant-eater, *Echidnia hystrix*, is really intermediary; its temperature varies 10° C. (18° F.) or

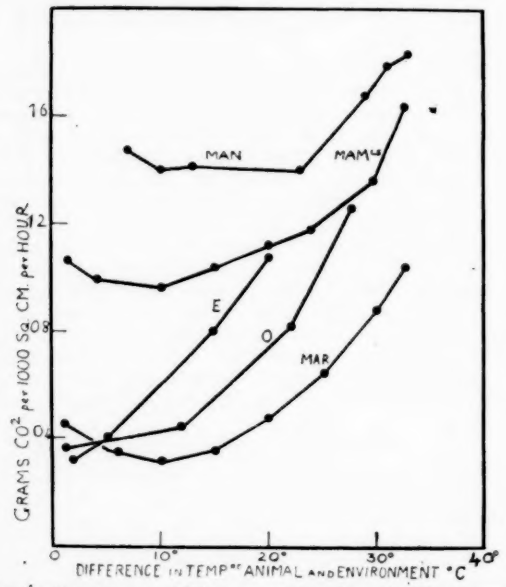
FIG. 6.



more as the external temperature rises or falls from 30° to 5° C. Fig. 5 shows in graphic form how the body temperature of a poikilothermic lizard (*Cyclodus gigas*), of monotremes, of a marsupial and of a cat varied after a couple of hours' sojourn at temperatures varying from 5° to 37° C. The lizard's temperature followed the external almost exactly; the cat's rose 1°; the marsupial's 2°; the platypus' 4°, and the echidna's 8° C.

In order to see to what extent these different kinds of animals responded to the stimulus of a cold environment by increasing their heat production, they were enclosed in a glass vessel (A) through which dry air deprived of carbon dioxide was circulated (Fig. 6). The vessel was immersed in a large bath, the water in which was kept at the desired temperature. The air emerging from the vessel was passed through sulphuric acid and then through two large Mohr bulbs containing K O H to catch the carbon dioxide formed. The increase in weight of the two Mohr bulbs and the U tube containing pummice moistened with sulphuric acid, afforded

FIG. 7.



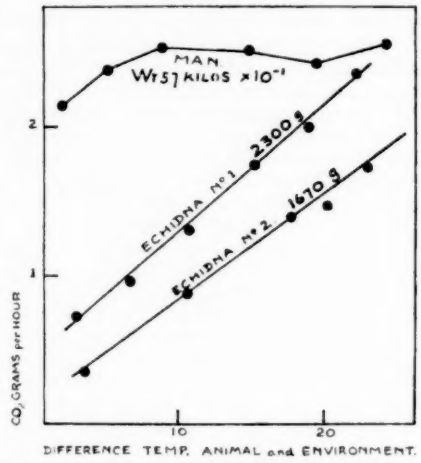
Combustion-rate per 1000 sq. cm. of surface of (M) mammals (cat and rabbit), (E) echidnas, (O) ornithorynchus, and (MAR) marsupials, according to the difference in temperature between them and their environment. The graphs represent the average results of several experiments. The observations on man were made by Voit (1878).

a measure of the carbon dioxide formed by the animal during the period.

Fig. 7 shows graphically the variation in combustion in the animals according to the difference in temperature between them and their surroundings, together with that of a clothed man, observed by Voit (1878) under somewhat similar conditions. The rate of combustion is expressed in grammes of carbon dioxide per hour per 1000 sq. cm. of surface. This is done because the animals were of different sizes, and in the same kind of animal of the same age combustion varies nearly in proportion to its surface.

The cost in fuel of the various animals for the same external temperature varies. This is partly accounted for by their insulation, partly inherent in them. It is particularly noticeable at higher external temperatures when man is expending five times as much energy as a marsupial, wastefully and to his discomfort. In contrast to all the other creatures, it was not until the external temperature fell below 14° C. that Voit's man varied his heat production at all. The echidna evidently utilises chemical regulation most (without, however, achieving a constant temperature), then the marsupials, and the cat and rabbit least, until the external temperature falls below 10° C.

FIG. 8.



Combustion-rate of the monotreme *Echidna hystrix* compared with that of man according to rate of heat loss. The observations on man were made by Wolpert (1898).

The curves are composite ones for several animals of the same kind. Fig. 8 illustrates the carbon dioxide production of two echidnas and a man plotted against difference in temperature between inside of animal and environment. The ordinate for the man is divided by 10. The combustion in the echidna is, within the error of such an experiment, proportional to this difference, whereas the combustion for the man is largely independent of it. The echidna has no sweat glands. It does not pant when it gets hot, although it shivers violently with cold. As it does not seem to have means of varying the water evaporated, if its combustion is proportional to difference in temperature between it and its environment, it is varying production closely in proportion to loss, a fact which suggests that this is the only means of adjustment employed.

Regulation of temperature by varying production would seem, therefore, to have been the first method arrived at in the development of homœothermism. It is the cheapest, but is no protection against high air-temperatures. At an external temperature of 35° C. an echidna soon succumbs. A body temperature of 39–40° is incompatible with life. In their natural conditions echidnas burrow, and in

hot weather emerge only after sundown. In the winter they hibernate, and reduce the expense of existence to a minimum.

If chemical regulation is phylogenetically the more ancient method it should, in accordance with biological principles, precede regulation by varying loss in the development of the young animals. Pembrey (1894) studied the power of adjustment to temperature possessed by the embryo chick in the egg and that of the chick after emergence. He found that up to the eighteenth day a chick in the egg behaved like a cold-blooded creature, and that its carbon dioxide production rose and fell with the temperature of its surroundings. At the nineteenth and twentieth day it began to do the opposite, and before leaving the shell had already acquired a considerable capacity to vary heat production in response to external temperature. One day after hatching, a chick was found to double its carbon dioxide production when its environmental temperature fell 20°. Pembrey (1895) also made similar observations on mammals which are born in different states of immaturity. He found that they all possessed some power of regulating heat production, varying according to the stage of development they had attained when they commenced their extra-uterine existence. As he did not make direct calorimetric observations, Pembrey's experiments do not decide when physical regulation first appears. This has, however, been done by Babak (1902) on new-born babies. From his observations he concludes that physical regulation is not yet manifested at birth, but is gradually developed a few days afterwards.

A REVIEW OF THE TREATMENT OF ASTHMA.

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This paper is based upon the study of the treatment of some 60 children, with asthma of all types. No disease can show a more diverse and baffling literature and to the casual observer the differing statements of the various camps must seem almost ludicrous.

In a recent paper, however, McDowall [1] has shown that all may be partly right. Assuming that bronchial constriction is the main symptom of asthma, he summarises the various methods by which this may be brought about —viz.: (1) *Directly*, by the inhalation of irritating gases. (2) *Chemically*, by histamine and peptone. (Here he describes a biphasic reaction on the part of the bronchi to these substances, the first being an immediate contraction, the latter a delayed and much more profound relaxation.) (3) *Nervously*, through the vagus. (The vagus may be stimulated psychically by suggestion or reflexly through the fifth nerve by irritation of the mucous membrane of the nose.) McDowall quotes some important experiments of his own which show that foreign proteins have a profound influence on the vagal system. The injection of foreign proteins into certain animals tends to hypersensitise their vagal systems and in certain cases leads directly to bronchial constriction.

If we examine the different treatments of asthma in this light it is possible to see that one and all, under certain circumstances, can be of theoretical value. Peptone, administered intravenously, between attacks in small enough doses will fail to give its primary reaction of constriction and only give its more powerful secondary reaction of relaxation. Psychotherapy will remove any psychical stimuli which may "start off" a hypersensitive vagal system. Operation on the nose, in cases of nasal defect, will remove the local reflex through the fifth nerve to the vagi. Hydrochloric acid and pepsin, by aiding digestion, particularly in cases of achlorhydria or hypochlorhydria, will prevent the absorption of the allergising protein molecules into the blood stream. Specific elimination of offending proteins will remove the patient from contact with the allergising substance, and desensitisation, by repeated injections of minute quantities of the allergen, will produce a temporary circulating antibody. The action of glucose is not clear, but Oriel claims that it tends to steady the unstable metabolism found in a particular type of asthmatic child. X ray therapy and protein shock act presumably by changing the body chemistry temporarily in some way, possibly by the production of histamine.

By accepting McDowall's hypothesis as the true explanation of the fundamental ætiology of asthma we can discard the narrow view of any one camp and approach the problem of treatment with an open mind.

Logical Sequence of Various Treatments.

It now becomes possible to group the recognised treatments in their logical sequence:—

(*a*) *General measures.*—Under this heading is included the general care of the child's health, both mental and physical—e.g., sufficient rest, diet, and exercise.

(*b*) *Measures to remedy faulty digestion and metabolism.* Bray [2] holds that many cases of asthma have a reduction or absence of hydrochloric acid. In these cases he claims that great benefit may be obtained by giving a mixture of hydrochloric acid and pepsin. Oriel [3] describes a type of asthmatic child in which the asthma is associated with other allergic conditions, such as eczema and cyclic vomiting, and in which the blood chemistry shows a high amino-acid content and a low blood-sugar. These cases, he states, show an unstable metabolism alternating between an acidosis and an alkalosis. He claims that glucose given in large quantities (four ounces per day) will help to steady the metabolism of the child and cause cessation of attacks.

It is clear, therefore, that a careful study of the child's body chemistry should be made in all cases, and where conditions as described by Bray and Oriel exist their treatment should be adopted. In some patients these types will no doubt overlap, in which case a combination of glucose and hydrochloric acid may well be tried.

(*c*) *Measures to rectify nasal defects.*—A skilled rhinologist who has made a special study of asthma should examine all cases. He will be able to select a number where a deviated septum, hypertrophic rhinitis, or sinus infection is the causal factor and which can be cured by operative procedure. The diagnosis of cases due to infection of the upper respiratory passages is more fully discussed below.

(*d*) *Psychotherapy.*—In children it is very rare for the primary cause of asthma to be a neurosis, the curing of which leads to cessation of attacks. I know of three patients cured by psychotherapy, but they were all women between 40 and 50 years of age. However, we must include the breaking of the "habit" of asthma under this heading. It is essential to treat the attacks efficiently so as to dispel fear from the child's mind, and to continue

investigation until we find some method of treatment which will lead to cessation of attacks, if only for a while, as auto-suggestion plays a very big part in the causation and confidence in eventual cure is essential.

(*e*) *Specific diagnosis of allergic type.*—This is best accomplished by a comparative study of the physical examination with a special history and a subsequent number of skin tests. Large numbers of skin tests by themselves are of little value and are often misleading. This method has been much abused in the past, unfortunate patients having been subjugated to over 100 such tests by the "specialist" without any clear rationale.

By these means the allergic type may be divided into main sub-types depending on the kind of allergen to which the patient is hypersensitive and its mode of entry into the body—e.g., respiratory and alimentary other than bacterial, and bacterial products from foci of infection. The sub-types may be yet further sub-divided according to the actual allergen or allergens involved. The Table shows some 33 cases

Table of Types.

Bacterial.	Respiratory.				Multiple.	Total.	Diagnosis.
	Epidermal.	Pollen.	Food.	Dust.			
							History.
5	0	0	0	2	5	12	Winter.
0	0	4	0	0	0	4	Early } Summer
0	0	3	1	1	2	7	Late }
0	0	2	0	5	0	2	Locality as factor.
6	0	1	0	0	2	9	Infections as factor.
0	0	6	0	0	1	7	Pollens } possible
4	2	4	0	5	9	24	Epidermals } factors.
1	0	0	1	0	1	3	Foods }
0	0	1	0	1	4	6	Allergic history.
2	1	3	0	4	7	17	Allergic family history.
							Physical Examination.
0	1	0	0	0	3	1	Emphysema.
3	1	2	0	1	8	15	Chronic bronchitis.
7	1	0	—	1	0	9	Tonsillitis or adenoiditis.
3	—	1	0	0	1	5	Sinusitis.
							Skin Tests.
0	2	0	—	1	2	5	Cat } Epidermals.
0	0	0	—	0	1	1	Dog }
0	1	3	—	5	13	22	Feathers }
0	0	0	—	1	4	5	Orris root.
0	0	0	1	1	3	5	Egg .. Foods.
0	0	5	—	2	9	16	Ragweeds } Pollens.
0	0	3	—	0	5	8	Grasses }
0	0	1	—	6	5	12	Dust.
7	2	6	1	5	12	33	

worked out on these lines. They were all tested with extracts made up in the hospital laboratory; previously, extracts supplied by two well-known firms had been used with only very partial success. All the cases included were studied for over 12 months, and although the Table is far from perfect it serves to demonstrate a number of important points.

In this Table all the bacterial cases are from the respiratory passages, for I was unable to demonstrate intestinal infection as the causal factor in any of my cases. The respiratory group is divided into three sub-groups—viz., epidermal, pollen, and dust (the dust referred to was obtained from sweepings from the patient's own houses). Only one case was demonstrated to be hypersensitive to one food, and one only, and hence most of these cases fall into the multiple group.

For the sake of simplicity, only a limited number of skin tests have been included. Skin reactions to bacteria are brought about by a different mechanism than that of the other protein cutaneous reactions; the former occur at once and are probably a nervous reflex, while the latter do not reach their maximum for 24 hours, being of serological origin, and hence have been excluded from this Table.

If the Table is studied the frequencies will be seen to fall into definite positions in the different groups, showing a correlation between history, physical examination, and cutaneous reactions. For example, most of the bacterial cases occur in winter, are associated with chronic infection, and give generally negative skin reactions, while the pollen type occurs in summer and shows a marked skin hypersensitivity to pollen.

TREATMENT AFTER DIFFERENTIAL DIAGNOSIS.

The first five sub-groups should be treated by specific desensitisation and elimination. For successful treatment of bacterial cases the closest coöperation between the nose and throat surgeon and the physician is essential. It is not sufficient to hand over these cases to the former with the tentative diagnosis of "infection," for it often impossible for the surgeon to tell which is primary in cases of nasal defect associated with asthma. In the cases operated upon the morbid remains or washings should be set aside and cultured; from these cultures vaccines should be prepared by growing the organism in broth for 24 hours and then killing it by heat and carbolising it. By these means the exotoxins are retained as well as the endotoxins. Subsequently the patient should be treated by injections of minute doses of the diluted whole broth culture. All the bacterial cases in my Table were treated in this way; three ceased having attacks altogether, in one the attacks tended to recur after eight months, two were much improved, while one remained unchanged.

The epidermal, pollen, dust, and food sub-groups should be treated by elimination, and desensitisation by inoculation at weekly intervals with minute doses of the offending antigen. As in the case of hay-fever, it will be found that the immunity thus procured is but temporary, and tends to pass off in from six to eight months after the course of treatment. About half my cases showed this tendency. A second and if necessary a third course of "desensitisation" should be tried in these cases. This type of asthma is analogous with hay-fever. In the latter it has been found almost impossible to desensitise a patient in the presence of the antigen. It is this which makes the treatment of asthma by desensitisation so difficult, as it is often impossible to remove the patient from contact with the offending protein (antigen) while desensitisation is in progress.

It is doubtful if we are actually desensitising the patient by this means. In hay-fever and asthma the skin reactions often remain positive during treatment although they may vary in intensity. It is, therefore, more probable that we are merely producing a temporary antibody in the blood, and that when this gets used up the attacks tend to recur once more, the foreign protein being able again to reach the hypersensitive cells. Weil[4] has shown, in experiments on guinea-pigs with anaphylaxis, that the anaphylactic state may be masked temporarily by the injection of small amounts of the antigen producing a temporary homologous antibody. In this connexion it is interesting to note a possibly analogous condition with the bacterial allergy described by Swift and co-workers.[5] They have shown that bacterial allergy is not altogether specific and that groups of organisms produce a group allergen. Dochez [6] describes both specific and non-

specific allergens from bacteria. In cases of multiple hypersensitivity it has often been observed that desensitisation to one allergen will cause cessation of attacks, even when the patient is exposed to other allergens to which he is still sensitive. The success of W. S. van Leeuwen's tuberculin treatment can thus be explained. Tuberculin is a very powerful allergen, and when given in minute doses—e.g., starting with 0·1 c.cm. of one millionth O.T.—it is surely such a method of desensitisation.

The multiple sub-group in this Table comprises 39 per cent. of the total. Actually in England, where pollen asthma is rare in children, it would be at least 50 per cent. It is difficult to say what actual percentage of all cases attending an asthma clinic in London would fall into this sub-group, but I would venture to say that they would be at least 20 per cent. It is clear that cases cured by more general measures, already referred to, although they may have been multisensitive, are not now included in this sub-group. It is the problem of what to do with this multisensitive type of case, often indeed the most severe, which has taxed the asthma specialist in the past, and it is here, I think, that non-specific therapy has a place. Of 14 cases treated by non-specific therapy of which I have full notes, 3 ceased having attacks altogether, 2 tended to recur after eight months, 3 were much improved, and 6 were unimproved. In the literature all forms of non-specific treatment have adherents. Non-specific desensitisation to tuberculin or some other allergen is easily carried out. X ray therapy, where possible, is slightly more efficacious; either of these treatments may well be tried. Peptone and like compounds are not advisable, as they may lead to dangerous results in very hypersensitive cases. Protein shock tends to lead to deterioration of the child's general health and is not to be recommended, except as a last resort.

Although discussion of palliative measures is not part of this paper, control of the actual attack is of such fundamental importance in the treatment of the whole condition that it is necessary to mention it. In this connexion two drugs, adrenalin and ephedrine, both strong sympathetic stimulants, must be primarily considered. Adrenalin will cut short the attack at once if given in large enough doses hypodermically. In no case should more than ℥3 be given in the first place to a child, but if this does not produce the desired effect another ℥3 may be given at the end of 15 minutes, and so on until the worst of the spasm is relieved. Ephedrine has the advantage that it may be given by mouth or in the form of a nasal spray, and hence can be used by the patient without call upon the doctor or nurse; 0·025 g. of ephedrine sulphate may be given with safety by mouth, or a 3 per cent. solution of the chloride as a spray. The latter is of particular value in cases of pollen asthma and those associated with nasal defect. I have used this drug in over 50 cases with excellent results and have not found it upsetting to the child. This may have been due to the fact that we were using a specially pure preparation sent us from the pharmacological department of the University of Peking. Bray and others have not reported equally successful results from the preparations commonly used in this country.

There are many time-honoured methods of treating the attack, chiefly by inhalation of compounds containing stramonium or lobelia, but none compare in efficiency with adrenalin or ephedrine.

It is possible, then, to provide the patient with such an effective defence against the acute spasm of asthma that fear of the attack may be largely overcome, a factor of the greatest psychological importance in the general treatment of the disease.

The work referred to in this paper was done while holding a Rockefeller Research Fellowship. I wish to thank Dr. E. A. Park for allowing me to use cases from the Children's Department of the Johns Hopkins Hospital, and Dr. L. H. Gay for his help and advice.

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PRURITUS ANI ET VULVÆ.*

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AND
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THE causes of pruritus ani et vulvæ are many and varied. Some of these, such as eczema and certain dermatoses, are obvious upon inspection, or, at any rate, become so after a comparatively simple examination, while the dependence of the distressing condition upon constitutional reasons, such as diabetes, the gouty diathesis, and changes in adjacent structures, including piles and enlarged prostate, are well known. Other contributory factors may be the climacteric period, colitis, constipation, certain articles of food, oxyuris, pediculi, and, of course, affections of the rectum or vagina. Pruritus, which has an underlying bacterial origin, be it *Bacillus coli*, *Streptococcus fæcalis*, or *Staphylococcus albus*, is familiar, and a mycotic variety, due to epidermophyton and trichophyton, can sometimes be demonstrated by careful and repeated microscopic examinations.

There is, therefore, a great variety in the known ætiology, but the pruritic condition is often met in which diligent examination fails to find a cause. These cases are attributed to disease of the nerves or interepithelial nerve-fibrils supplying the affected areas. Many cases without any discoverable ætiological factor will become intelligible when laboratory methods have advanced. Already it is a reasonable belief that there is no such thing as pruritus sui generis.

Symptomatology.

The symptomatology of pruritus may be epitomised with the one word "itching"; all the signs and symptoms can be traced to the violent scratching to which a patient resorts in order to find relief. The itching is usually paroxysmal, as a rule worse at night when the patient is warm in bed, and in the early morning owing to secretion of mucus. The disease is more common in men than in women, and being a more frequent affection of the well-fed and well-to-do, is oftener seen in private than in hospital practice. The excoriations, the little cracks and fissures, the ulcerative and pustular lesions, indurations, and eczematous appearances are all due to this cause; local mischief may be originally due to any of the reasons set out, but is then exaggerated by the scratching. The itching is often of a severe type, and may lead to far-reaching irritation and to the more serious consequences of insomnia and

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melancholia; even insanity and suicide, though remote probabilities, have to be borne in mind, as well as the possibility that we are dealing with a prodromal symptom of malignant disease. Fearful of the onset of a paroxysm the sufferer withdraws from his or her fellows. Irritability and loss of temper on trifling occasions are common, and these patients are apt to become morbid and morose, even though there are no more serious mental manifestations. In pruritus of mycotic origin there may be seen minute red, slightly raised, infiltrated patches in the peri-anal region, occasionally arranged into two curved lines.

The pruritic area is reddened, and the fissures and cracks are usually small and moist. When they affect the area of skin surrounding the anus, puckered up by the action of the corrugator cutis ani, they can only be seen when the skin is put upon the stretch. Not only the peri-anal skin may be affected, but the irritation may extend to the scrotal area and also up the abdomen.

All the symptoms have been much observed and recorded, and their recapitulation must be excused because all have to be watched for in the treatment of this obstinate malady.

Treatment.

The successful treatment of pruritus taxes therapeutic ingenuity, and the reason for so many failures, partial or total, is that the attention to detail—without which success is often impossible—proves tedious both to patient and physician alike. But most patients will willingly submit to prolonged temporary inconvenience when accompanied with improvement, however slow, rather than have recourse to surgical interference—Ball's operation being the recognised operation.

Consider the local complications which it may be necessary to treat. Among these are chronic constipation, hæmorrhoids, ulcers, enlarged prostate, discharges (including irritant urine or fæces or even leakage of petroleum), caruncles, persistent Pacinnian bodies, hypertrophied anal papillæ, and any co-existent skin diseases, such as eczema. Of course, attention must be paid to the general health of the patient. It is sometimes found that in his diet there is something, perhaps a favourite food, towards which he is showing an evil idiosynerasy. Moderation in alcohol and tobacco will be found beneficial. Especially, every effort should be made to restore sleep when insomnia is present. Luminal is useful, and it should be remembered that opium and its derivatives often not only fail to give relief but actually aggravate the irritation. Direct treatment falls under the two groups comprised in physiotherapy.

The small cracks which are of so frequent occurrence may be treated by means of ultra-violet radiation and X ray, but they may also be healed by painting them with friar's balsam or touching them lightly with a stick of silver nitrate. The treatment *must* persist until the most careful examination fails to reveal any trace of erosion. Those which are associated with pruritus of mycotic origin are more amenable to collosol iodine oil or tr. iodi (half strength), or mitigal, an organic sulphur preparation (Schottmuller), or some such prescription as Deek's ointment half strength.

The formula for Deek's ointment is:—

℞	Salicylic acid	4 parts
	Bismuth subnitrate	10 ,,
	Mercury salicylate	4 ,,
	Oil of eucalyptus	4 ,,
	Vaselin and lanolin equal parts up to 100 parts.	

As a general cooling lotion, and to ease the erythema after ultra-violet radiation (when erythema ought to be produced), a calamine and zinc oxide lotion is invaluable, and may be dabbed on the affected area two or three times daily. The need must be impressed upon every patient of thorough washing after each defæcation with some soap such as the germicidal soap of Parke, Davis, or Crooke's Collosol argentum soap. After this the parts should be gently dried with salicylic acid wool and calamine lotion applied.

Should any cracks or excoriations persist—and they often will, so that patience and perseverance are requisite—then the use of an ointment such as the following is recommended:—

℞	Hyd. subchloridi	2 drachms
	Bismuth subnitratis	1½ drachms
	Tr. aconiti	8 minims
	Glycerini	2 drachms
	Unguenti sambuci	up to 1 oz.

to be used night and morning.

When a paroxysm of irritation is threatened, a 2 per cent. carbolic lotion with spirit and rosewater will often abort an attack. The lotion should be kept at the bedside. Pinching the irritable parts does much less harm than scratching, and affords equal relief; patients will soon learn the importance of this suggestion. Should the parts get sodden with the characteristic unpleasant smell, dry calomel powder will prove serviceable.

Coming alike under general dietetic and special treatment the value must be remembered of recourse to spas like Harrogate, Luchon, Aix-les-Bains, Schinznach, and many others. Here special apparatus directs a fine rose spray of warm sulphur water, once daily, for five or ten minutes locally against the irritable and often excoriated anal region, affording very great relief. The ordinary routine spa treatment will certainly also be of benefit. In cases of pruritus where the cause is believed to be bacterial, vaccine treatment must be borne in mind. An autogenous vaccine may be prepared from a culture made from scrapings taken from the affected anal area. For the details and dosage of this one must be guided by the bacteriologist.

Radiological Therapy.

The treatment of obstinate pruritus calls for work in which the dermatologist may find a useful collaborator in the physiotherapist. Radiology offers to the dermatologist one of the most valuable adjuvants in the treatment of pruritus ani et vulvæ. It is an agent which eases the hyperæsthesia and allays the irritation, and inasmuch as it possesses a stimulant and bactericidal action it has a definite curative influence; used with intelligence, it is incapable of producing any harmful effects. In pruritus, as in many skin diseases, nearly a 50 per cent. benefit is obtained if general irradiation by ultra-violet light of the whole body be added to local treatment, when there is not only the bactericidal and other local action, but there is, added to it, the general building up of the resistance of the patient which has been lowered by the continuous irritation and often its resultant insomnia. The probability of success is increased by half as much again through giving the general body bath, twice or three times weekly. By these baths the calcium content of the body is raised. Dr. Agnes Savill[1] says: "Calcium lactate is so often useful in these cases"—which may be the reason for the good effect of the general body bath of ultra-violet light radiation. Ultra-violet radiation exerts a biological action in the neighbourhood of inter-

[1] THE LANCET, 1929, i., 731.

epithelial nerve-fibrils, and if the pruritus be caused by the *Staphylococcus albus*, *Streptococcus fæcalis*, *Bacillus coli communis*, or such mycetes as the epidermophyton or trichophyton, then the lethal effect of radiation will readily account for them.

The affected area should be viewed with a magnifying lens in a good light, and possibly tested with a small ultra-violet light, through a Wood's filter, in order to show any slight cracks or minute fissures or to demonstrate the presence or absence of fungoid disease. Scrapings should be taken, and other means for pathological examinations conducted, so as to furnish the bacteriologist with all the material required, and if, as will often happen, a negative report be obtained, examinations should be repeated several times.

The patient should be prepared for local treatment. In France, especially since treatment with the various forms of rays has come into use, shaving is usual where the conditions have invaded the hairy skin. The parts having been shaved, they should be thoroughly cleansed with soap and water and carefully dried. Any crusts should be removed with the hands, in rubber gloves if preferred, the parts should be smoothed out, and held apart so that the folds or deeper parts of the recesses may become exposed to the treatment.

The treatment must of necessity vary with each individual, and with the length of time which the disease has lasted. It should begin with an exposure to ultra-violet radiation. The most convenient method of application to these regions is by means of the Kromayer water-cooled lamp. It is impossible to lay down the precise dose, as there are so many factors which vary it. The lamp may be used at a distance of two or three inches, with a four-minutes exposure, or it may be placed in contact with the skin, the duration of the exposure varying inversely with the square of the distance. After a period varying from four to six hours a reaction and an erythema should appear. In pruritus vulvæ the patient should be warned that this reaction may be sufficiently severe to render it advisable that she should stay in bed for a day—possibly two days, but her previous sufferings will usually cause her cheerfully to assent to a temporary suspension of her walking activities. The counsel of perfection is that the second application of ultra-violet rays should take place as soon as the erythema has subsided, and the distance remaining the same the time should be increased by one or two minutes, according to the measure of erythema produced. Where, owing to the patient living far away from the practitioner, or from any other cause, the successive treatments cannot be regulated by the disappearance of the erythema, then it has been found a useful rule to give one ultra-violet ray treatment in the first week and two treatments in the second, and one treatment every week thereafter. Six or twelve treatments are usually needed. The first treatment allays irritation to some extent, not because all the bacteria or fungi are destroyed or other cause removed, but because the light acts as an analgesic to the nerve-endings. Ultra-violet rays will often heal the small cracks and fissures so often revealed when the rays are passed through a Wood's filter. Once recognised they are easily cured by the application of the lamp in contact with the lesion, employing a quartz applicator. It must be repeated that the healing of these cracks is essential to successful treatment. At the time of treatment the patient should be told to expect an erythema to appear, and the lotion may be given to allay the irritation. This irritation, it should be explained, is a necessary and salutary concomitant of the treatment; if this warning be not given, the patient may complain of a "burn."

The toilet of the pruritic area is of the first importance. The area must be kept scrupulously clean—there is much to be said for the universal use of the *bidet*, rarely seen in our country. The lower bowel must be kept empty by any mild aperient to which the patient may be accustomed or by an enema or glycerin suppository. In some cases a course of Plombière douches twice or three times weekly is of great advantage.

X ray treatment of pruritus continues to be a success; its disparagement has sometimes come from those without adequate experience, based upon some improper employment. In THE LANCET nearly six years ago, in one of the special articles on Modern Technique in Treatment, a paper by Dr. Louis Savatard contains the following passage:—

> "Radiation by means of the X rays I now use as the routine method of treatment for pruritus ani. Not only have the rays a marked antipruritic action, but they also reduce induration of the skin. X rays seem to have entirely suspended surgical division of the nerves, and not a few cases which have recurred after operation have remained permanently well after but a few exposures to the X rays." [1]

Our own experience is that X rays are of the utmost value in pruritus, especially in cases of long standing. The rays are directed into the anal area, perineum, and, in woman, to the vulvæ. The treatment may be given with the patient lying on the side on a couch, but I (F. H. H.) have found it more convenient to use a special stool invented by Curtis Webb, which can be placed over the X ray tube. In the seat is a circular aperture, 4½ inches in diameter, through which the rays are directed. When the patient is seated on the stool the affected area can be accurately centred and the cheeks of the buttocks easily separated and maintained in position. In males the testicles are protected by a sheet of lead on the seat. The best results have been obtained with fairly soft rays given in divided doses. I use an equivalent spark gap of 5–6 inches, unfiltered, for the first three treatments, and for the last three a filter of 1 mm. of aluminium. Six doses of 1/6 β are given, either daily or spread over a fortnight, as the severity of the case demands. For various reasons there is a danger of sterilising patients, but that this cannot be easily guarded against in women seems to me without foundation.

Other electrotherapeutic measures have been used in the treatment of pruritus. Dr. J. M. H. MacLeod speaks well of zinc ionisation, and both here and in the United States of America it is our personal experience that static electricity has been used with considerable advantage. It is applied by means of vaginal or rectal glass vacuum tubes which are energised from the static machine. Its application is sometimes immediately effectual, often giving an instantaneous relief from the itching. The smallest size tube should be used at first, and the larger ones gradually substituted in succeeding treatments. It may be that the mechanical stretching of the anal area is of service. Dr. Agnes Savill devised a specially shaped tube, large enough to fit over the entire vulvæ. It is specially indicated when there is much swelling. It is pressed upon the swollen part and held in close contact. The treatment should be repeated daily. Both the vacuum tube for external use and the vaginal or rectal tubes for internal application, already mentioned, can be energised by the more familiar high-frequency machine and the results obtained may be equally good; but a careful

[1] THE LANCET, 1924, ii., 923.

comparison will show that the current is infinitely more agreeable to the patient when derived from the static machine.

The list of remedies to be used with advantage in the treatment of pruritus is by no means exhausted, as can be believed when its manifold causation is recalled. There are many therapeutic measures of which we have no personal knowledge, such as the destruction of the nerves at the point of their entry into the skin, and the injections of alcohol as described by Dr. Harvey B. Stone. The thickened peri-anal skin has been thinned by various applications, such as pure carbolic acid, solid CO_2, and even, under general anæsthesia, by the actual cautery.

Doubtless many remedies have been tried of which we have never heard, but the measures outlined, which we have actual experience of, if carefully applied and if painstaking choice is made between them, used separately or in combination will usually in the end achieve success.

ABDOMINAL TORSION OF OMENTUM.

By Michael J. Smyth, M.Ch. N.U.I., F.R.C.S. Eng.

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The seven cases recorded below are examples of a rare variety of torsion of the great omentum—sometimes referred to as a true or pure intra-abdominal torsion. Five of the cases have been taken from the post-war records of the London Hospital. A sixth has been kindly supplied by Mr. C. J. MacAuley, of Dublin, who has already reported a case, while the seventh was operated upon by the writer at North Middlesex Hospital, Edmonton. Four of the cases answer to the common conception of torsion of omentum, inasmuch as the whole or a large portion of the structure was involved in each. In the other cases small or isolated portions only were affected, yet symptoms were severe enough to determine operative treatment. For this reason, apart from the rarity of the condition, it was thought advisable to include all the cases in this series.

As surgical text-books in the main do not distinguish between the different varieties of the condition, I shall consider briefly what classification has been arrived at, and what exactly is meant by pure intra-abdominal torsion.

Hernial Variety.—The great majority of cases of torsion of omentum occur in association with right-sided inguinal hernia. Other varieties of hernia, including ventral and umbilical herniæ which so often accommodate omentum, rarely figure as complicating factors. In the hernial variety torsion may affect the intrasaccular, the intra-abdominal, or both portions of the omentum. If a hernia be present and the twisted omentum shows no direct communication with the sac, the hernia is nevertheless suspect, and the case is ruled out of the category of pure intra-abdominal cases.

Abdominal Variety.—If torsion occurs and no hernia be present the condition is known as "true or pure intra-abdominal torsion." Such cases may, however, be complicated by intra-abdominal lesions such as appendicitis, pyosalpinx, and ovarian cysts, or they may arise without any apparent complication. The term "pure intra-abdominal torsion" would be better reserved for those which show no intra-abdominal complications whatever. With this slight modification, Cowell's classification would read: 1. Hernial—(*a*) intrasaccular, (*b*) intra-abdominal, (*c*) combined. 2. Abdominal—(*a*) pure intra-abdominal, (*b*) associated with disease of abdominal or pelvic organs.

Abdominal torsion of omentum is undoubtedly a rare lesion, but not so rare as was formerly supposed. Before Cowell's review of the subject—a review covering the period 1882–1924—not more than 18* cases had been recorded, and of these only three were contributed by British surgeons. His excellent paper has evidently borne fruit, for in the five years since it appeared almost as many cases again have been added to the literature, a majority now coming from British surgeons. MacAuley has had the unique experience of dealing with three cases, in one of which, however, a hernia was present, while Wakeley records two typical cases which came under his care.

There is hardly a case on record where diagnosis has been successfully made, yet the majority of cases have been recorded by surgeons of great experience. The condition is most apt to be mistaken for acute appendicitis, acute cholecystitis, and sometimes even for acute perforation of a peptic ulcer. Absolute accuracy in diagnosis is not of paramount importance, provided, of course, that operative and not conservative treatment is adopted.

Pathology.

The strangulated mass varies in size. The whole of the omentum may undergo torsion, but the part most frequently affected is the right side. Sometimes an isolated tag or a so-called accessory omentum is all that is found to account for symptoms. The condition in which the mass is found depends on the time at which operative treatment is undertaken. In the earlier stages it is more or less compact, and varies in colour from dark red to purple or black. Later on it may show signs of disintegration, with perhaps the addition of local or diffuse peritonitis, probably as a result of infection from the bowel. The mass adheres to the neighbouring viscera and the parietal peritoneum, but so lightly that gentle insinuation of the finger suffices for separation. Such delicate adhesions are to be distinguished from the permanent organised ones of past inflammatory trouble or perhaps a previous laparotomy. The mass is attached at its central or colic end by a pedicle which has undergone rotation a number of times, varying from one to ten. The pedicle also varies in size; usually it is about the thickness of a finger, but if the twists can be undone it thins out considerably, and transfixion is thereby facilitated. There may, of course, be two pedicles, an adhesion forming the basis of the second. Blood-stained exudate in the peritoneal cavity, the natural sequel to strangulation of any abdominal organ, is present in all cases.

MOVEMENTS OF THE OMENTUM.

The great omentum has long been known as the "abdominal policeman." This is a nice metaphor, but the probabilities are that the policeman is less a policeman *in esse* than *in posse*. The omentum of itself should be incapable of movement. Microscopically there is no muscular tissue in its constitution, except that in its blood-vessels. These are neither large nor numerous, and to expect them, as has been suggested, to exert a material influence on the position of the omentum is to make too great a demand upon a very small amount of muscular and elastic tissue. Rather does it seem that its position at any time is determined by forces outside itself, such as movements

* Vick's interesting case (Brit. Med. Jour., 1911, i., 622) was not included in this list.

of the body in general, and in particular the action of the muscles of the abdominal wall and of the diaphragm, and the movements of the muscular viscera and intestines to which it is attached or with which it comes into contact. A healthy omentum should move on other healthy serous surfaces as well-oiled wheels on one other, but if, by virtue of its dimensions and the forces which control its position, it is brought in contact with the blemished surface of an inflamed organ it will offer the latter a protective attachment. Such attachment may develop into organised adhesion which, if slender or stalk-like, will not interfere with the play of movement necessary for torsion, but may act the part of a second pedicle. On the other hand, adhesions that are broad and firm or numerous will so seriously embarrass the omentum that rotation will probably be out of the question.

THEORIES OF TORSION.

Many theories have been advanced to explain abdominal torsion of omentum. Payr's views are based upon venous congestion and spiral twisting of the veins around the arteries, the elastic tissue in the coats of the latter being then relied upon to aid in bringing about the necessary rotation. Fagge, in his Bradshaw lecture on axial rotation, points out that such a theory presupposes the presence of venous congestion, a condition which is really the result and not the cause of torsion; and that in the case of an organ which has undergone torsion both arteries and veins are alike twisted in the pedicle. Fagge's researches further show that arterial circulation tends, if anything, to have a limiting and not an encouraging influence on the rotation of pedicles. It might be added that if the theory of venous congestion did obtain, then one would expect torsion of the testis in cases of varicocele to be a commonplace of surgery.

Other theories lay stress upon congenital malformation of the omentum, inflammatory changes in its structure, and increased intestinal peristalsis. It may be that there is a congenital tendency to pedicle formation. Prof. William Wright inclines to the view that the omentum is of the nature of an overgrown appendix epiploica, and states that if appendices epiploicæ are carefully examined and stretched out to the full extent of their structure it will be found that their free border is much longer than their border of attachment. Looked upon in the light of an overgrown appendix epiploica, or perhaps even an aggregation of these structures, it is conceivable that the omentum might occasionally display a congenital tendency to pedicle formation, but this at best is mere conjecture. Incidentally, appendices epiploicæ themselves sometimes undergo torsion.

The view here taken is that before intestinal peristalsis or body movement can bring about torsion of the omentum, some deviation from the normal structure is necessary—a deviation tending to bring it into line with other abdominal organs and tumours which are liable to rotation. A normal healthy omentum, spread apron-like across the viscera, should not readily lend itsef to torsion, but unevenness of structure, a localised concentration of tissue to provide, as it were, the bulk whereon the forces that bring about torsion can have purchase, and pedicle formation, are factors which will give the omentum in whole or in part the semblance of a tumour hanging freely in the abdomen.

"That such a tumour should by mere alteration of the position of the body, or by mobility imparted to it by a tumult of the bowels, spin round and twist its pedicle, is as comprehensible as the fact that a good weathercock moves in varying directions under the influence of the wind" (Bland-Sutton).

In this alteration in structure, inflammation with its consequent fibrosis and matting of tissue will no doubt play its part; and to this may be added the factor of adiposity, for the condition occurs most frequently in stout people. Pedicle formation may trace its origin to congenital tendencies, but the probabilities are that this is also a pathological change, the altered omentum dragging upon its attachment and fashioning a pedicle of its own. The writer has had the opportunity of examining only two specimens of torsion of the omentum; both were fat-laden and showed definite signs of chronic fibrous change and matting of structure. Evidence in favour of this theory was given recently by a patient with acute left-sided pain, who was found at operation to have torsion of the left border of the omentum; in the twisted mass were found two tumours which proved to be accessory spleens.

The same forces which bring about torsion in the case of a single pedicle produce torsion in double pedicles. Here the intervening mass of omentum is anchored to two comparatively fixed points, and is rotated on its longitudinal axis in much the same way as a handkerchief is swung around between the hands when held at opposite corners.

It does not necessarily mean that, torsion having once begun, the affected portion continues steadily in its rotation until all slack is taken up and there is a sudden and absolute obstruction to the blood-supply. There is reason to suppose from a study of the histories of recorded cases that the lesion is primarily recurrent or chronic, and that the acute manifestation of torsion is but the final stage in a condition which has been maturing for some time. That is, torsion is of gradual evolution; a twist now and a twist again, some pain no doubt being caused by partial obstruction to the blood-supply, but the severe pain of strangulation being deferred until thrombosis of the supplying vessels is absolute. Such, according to Moynihan, is what happens in the analogous conditions of torsion of the spleen and ovarian cysts.

"In neither does rotation of the pedicle take place suddenly. In cases of ovarian cyst the movements of the whole of a large and often adherent cyst is impossible. The acute change is not in the twisting of a pedicle, but in the thrombosis of vessels which have long been twisted."

Clinical Features.

The patient, male or female, usually stout and of about middle age, is seized with an attack of acute abdominal pain. There may be a history of previous attacks. The pain is moderately severe, though not generally so severe as that of acute appendicitis. It tends to increase in severity, is not relieved by homely remedies, and is made worse by purgatives, even though the bowels be well opened. As the right border of the omentum is the part most frequently involved, the pain is referred to the right iliac or right para-umbilical region, but it may be referred to the right hypochondrium, the epigastrium, or the left side of the abdomen, varying with the situation of the twisted part.

The patient does not look ill; in fact the general condition is not in keeping with the abdominal upset. There is slight fever, 99°–100° F.; the pulse-rate rarely exceeds 120, while it is usually below 100 and may be as low as 80. Tenderness and rigidity are manifest over the site of the twisted mass. Some patients exhibit a degree of tenderness altogether out of proportion to the underlying lesion. This is in all probability due to involvement of the anterior parietal peritoneum, which shows inflammatory reaction at the site of adhesion. In torsion of the whole or a large portion of the omentum, rigidity

may be widespread, but this is unusual. The mass may be palpable if of sufficient proportions and if rigidity be not too marked. It is not firm to palpation, nor are its limits well defined. Some writers assert that a lateral mobility of the tumour can be demonstrated, but this statement must be received with reserve, for a mass of twisted omentum that is palpable will be at any rate adherent to the anterior abdominal wall.

Differential Diagnosis.

Acute Appendicitis.—The condition is most frequently mistaken for acute appendicitis. In typical cases of both there are, however, some features which may help to distinguish between them.

(1) While either lesion may occur at any age, acute appendicitis is more a disease of youth; torsion of omentum more a disease of middle age.

(2) Nausea and vomiting, if present, are said to precede the pain in omental torsion, whereas the reverse obtains in acute appendicitis.

(3) In acute appendicitis the pain is first referred to the umbilical region and later settles in the right iliac fossa, with a maximum degree of tenderness over McBurney's point; in torsion of omentum the pain is at all times referred to and maximum tenderness is present over the site of the twisted mass.

(4) In torsion the palpable tumour is present early, whereas in acute appendicitis time is required—two or three days—for its formation. The tumour in acute appendicitis is firm and circumscribed and is not mobile.

(5) Acute appendicitis, with or without abscess formation, is accompanied by constitutional disturbance in keeping with a toxic condition. The patient looks and feels ill, and the temperature and pulse are higher than in omental torsion.

A definite leucocytosis must not necessarily be taken as indicative of acute appendicitis. The great omentum is rich in white cells, and this content is markedly increased in acute inflammatory and traumatic conditions of the abdomen. This may or may not have a bearing upon the question, but the fact is that cases of omental torsion in which a blood-cell count has been done show a leucocytosis ranging from 12,000 to 18,000.

Acute Cholecystitis.—Pain and tenderness are definitely referred to the right hypochondriac region with catching of the breath. The pain in omental torsion does not radiate to the back or right shoulder. The temperature in acute cholecystitis rises to 101° F. or higher. As local rigidity disappears it may be possible to map out the enlarged and tender gall-bladder. Later there may be evidence of jaundice. A history of dyspepsia will also help.

Acute Perforation of a Peptic Ulcer.—The widespread rigidity exhibited by some cases of omental torsion, combined with the small degree of change in temperature and pulse-rate, may, if the case is seen soon after the onset of illness, lead to confusion with perforation of a peptic ulcer. Immediately after perforation the temperature drops to subnormal, and the pulse-rate may even be slower than normal for the individual, but when this initial stage has passed the temperature and pulse-rate rise steadily, the pulse becoming thready as time goes on. The onset of the illness in perforation is marked by agonising pain, the patient looks very ill, and with each succeeding hour his condition becomes more desperate. Under anæsthesia the mass in omental torsion will no doubt become palpable, for these are the cases in which the whole or a large portion of the omentum is involved. This was a point which enabled Wakeley to alter the diagnosis in his second case.

These are some of the points of guidance in typical cases, but abdominal cases, whatever their nature, have a habit of not being typical, and the main point at issue is whether operation is to be undertaken or not. Needless exploration is, of course, to be deprecated, but conservative treatment demands at least the exclusion of any serious abdominal lesion requiring operation. With urgent symptoms and symptoms which give rise to doubt, one is not infrequently driven to exploration. There is one danger in omental torsion, and that is, that while mistaking the case for one of acute appendicitis, conservative instead of operative treatment may be adopted. There are some surgeons who defer operation in cases of acute appendicitis once a certain time limit has elapsed from the initiation of the attack, sometimes, too, in the event of finding what is adjudged to be an appendix abscess. In the hands of its distinguished advocates this line of treatment has given cause for satisfaction, but it demands certainty in diagnosis, and the benefits of hospital are not available to all. A delay of a few days may not make a vital difference to an uncomplicated case of omental torsion, though the sooner operation is undertaken the better. We can, however, imagine the danger of delay in such a case as No. 7. The strangulated omentum would, no doubt, have provided an excellent culture medium for the organisms from the acutely inflamed appendix, of which it was a complication.

Cases.

1. *Mr. W. S. Perrin's case*, a married female, aged 47, was admitted to the London Hospital on Oct. 25th, 1922. Three days before admission she had complained of sudden acute pain in the abdomen, chiefly in the umbilical and right lumbar regions; the pain had been intermittent and at first severe, but had eased off later. It was still present on admission to hospital. There was nausea but no vomiting, and the bowels were very loose (four to five motions daily). She gave a history of many similar attacks during the three previous years, but none were so bad as the present one. In the attacks the patient could feel a lump to the right of her umbilicus, and she lay in bed for a week until the pain and lump subsided. The lump never completely disappeared, but between the attacks she felt quite well. The pain had no relation to food nor was there ever any sign of jaundice, and there was no trouble with micturition. There were no previous illnesses of any importance.

The temperature was 100·4° F., and the pulse-rate 104. The patient was a large obese woman. The tongue was slightly furred. The abdomen was greatly distended, and there was marked tenderness and rigidity to the right of the umbilicus and in the right lumbar region. There was no hyperæsthesia.

Operation.—The abdomen was opened by a right upper paramedian incision with retraction of the rectus outward. A large piece of twisted and strangulated omentum was found adherent to the transverse colon. The pedicle was ligatured and the mass removed. The peritoneum of the anterior abdominal wall was very much inflamed opposite the site of the strangulated omentum. The gall-bladder, duodenum, and stomach appeared normal. Enlarged glands were felt in the portal fissure. The incision was prolonged downwards and the appendix found after some difficulty. Appendicectomy was performed.

The after-progress of the case was satisfactory, and the patient was discharged from hospital on Nov. 10th, 1922. I have seen this patient in the follow-through department of the hospital. She has been very well since her discharge, and says that the lump never completely disappeared until she had her operation.

Microscopic findings.—(1) Hæmorrhagic infarction of omentum. (2) No active inflammation in slightly fibrotic hypertrophied appendix.

2. *Mr. James Sherren's case*, a married female, aged 41, engaged in housework, was admitted to the London Hospital on Sept. 24th, 1923. Four weeks before she had had a slight attack of pain in the upper abdomen, following exertion. Three days before there had been recurrence of a similar pain, which was, however, more severe, and doubled her up. The pain was situated just above th

umbilicus and, though it eased off somewhat, it continued until the time of her operation; it had no relation to food, and was relieved by resting in bed. There was no nausea nor vomiting. The bowels had been opened since the beginning of the attack, and there was no trouble with micturition. For 16 years the patient had suffered from attacks of pain coming on a few minutes after meals and lasting for a few hours. This pain was quite distinct from the acute pain for which she was admitted to hospital. It was situated much higher in the epigastrium "just below the breast bone," came on after each meal, and remained with her for two or three weeks with two to three months' free intervals. It was not associated with vomiting, and she had never been jaundiced.

Examination.—The temperature was 98·8° F., and the pulse-rate 96. She was a spare woman. There was a thick fur on the tongue and fœtid breath. Tenderness and rigidity were marked in the epigastrium. A small tense swelling was palpable a little to the right and above the umbilicus.

Operation.—A right upper paramedian incision was made and a poorly-developed rectus drawn outwards. A dark hæmorrhagic mass, a little larger than a walnut, was found adherent to the falciform ligament and to the anterior wall of the stomach. This proved to be a portion of the great omentum which had undergone torsion and was sealing off a perforating ulcer of the stomach. The gall-bladder appeared healthy. The appendix was long, fibrosed, and tacked down by numerous adhesions; it was removed. The twisted mass was separated from the great omentum and partial gastrectomy was then performed, the ulcer-bearing area of the stomach being removed, together with the adherent portion of the strangulated omentum.

The patient was discharged well on Oct. 15th. Seen in the follow-through department six months ago she said she had had excellent health since her operation.

Microscopic report.—(1) Chronic progressive peptic ulcer of stomach. (2) Fibrosis and muscular hypertrophy of appendix. (3) Hæmorrhagic necrosis of a portion of the omentum adherent to a chronically inflamed falciform ligament.

3. *Mr. Hugh Cairns's case*, a Hebrew male, aged 57, was admitted to the London Hospital on June 20th, 1925. On the day before admission he had a gradual onset of pain in the right side of the abdomen. There had been no nausea or vomiting. At 5 P.M. he had taken castor oil, and during the night supplemented this with Glauber's salts. The bowels were opened, but pain got worse. His temperature was 98° F., and his pulse-rate 94. He was tender and somewhat rigid in the right iliac fossa.

Operation.—The abdomen was opened by a muscle-splitting incision in the right iliac fossa. The appendix was injected, distended, and somewhat œdematous-looking, with fibrinous flecks on the serosa. Appendicectomy was performed. A tag of great omentum, the shape of its pedicle, was discovered hanging freely movable within the abdominal cavity. The strangulated tag was ligated and removed. The patient did well and was discharged on July 2nd. He reported to the out-patient department on March 17th, 1927, and was very well.

Microscopic findings.—(1) Subacute inflammation of appendix. (2) Congestion and hæmorrhage in omentum.

4. *Mr. Alan Perry's case*, a married female, aged 27, pregnant three months, was admitted to the London Hospital on Sept. 12th, 1925. Three days before the patient had been seized with sudden acute pain in the right iliac fossa. Vomiting and diarrhœa had accompanied the onset of pain. The vomiting ceased on the first day, and the diarrhœa on the second. There had been no appetite for two days. There was no pain on micturition and no history of previous attacks of pain. The patient did not look ill. Her temperature was 99·4° F., and her pulse-rate 116. Her tongue was furred. Tenderness, rigidity, and a lump were present in the right iliac fossa, and very slight tenderness in the left iliac fossa.

Operation.—A right paramedian incision was made, and complete torsion of omentum discovered (three turns). The pedicle was ligatured and the twisted omentum excised. Recovery was uneventful, and the patient was discharged to convalescence Sept. 24th, 1925.

5. *Mr. Russell Howard's case*, a married female, aged 33, nursing a baby 5 months old, was admitted to the London Hospital on Feb. 1st, 1927. Three days before admission the patient had complained of sudden pain to the right of the umbilicus, not very severe but constant. There had been no vomiting, and the bowels had been open each day since the onset of illness. Micturition was normal, and she had never had a previous attack. She was a healthy-looking woman. Her temperature was 99° F., and her pulse-rate 84. Her tongue was furred, and her heart and lungs clear. A tender palpable lump was present in the right hypochondrium. Graham's dye test showed no evidence of cholecystitis.

Operation.—On Feb. 10th an upper right rectus incision was made. A hard brown lump, 1 by 1 by 1 in., was discovered adherent to the anterior abdominal wall and to the stomach. On withdrawing it from the abdomen it was found to be a portion of the omentum which had undergone torsion. A small clamp was put on the stomach end of the mass, its pedicle transfixed, and the mass removed. The raw surface on the stomach wall was peritonealised by fine catgut and the abdomen closed. The patient made a good recovery, and was discharged well on Feb. 26th. In reply to a request to come to the follow-through department of the hospital she wrote to say that she was very well and had had no further trouble since operation.

Microscopic diagnosis.—Chronic inflammation and areas of necrosis of adipose tissue in portion of omentum.

6. *Mr. C. J. MacAuley's case*, a youth, aged 18, was admitted to the Mater Misericordiæ Hospital as an urgent abdominal case on Feb. 17th, 1928. He stated that on the previous day he had been seized with a severe pain in the right iliac fossa. He had vomited once, and his bowels had not been opened since the onset of the pain.

He was a healthy-looking youth. His temperature was 99° F., and his pulse-rate 94. The abdomen was undistended. He referred the pain to the right iliac fossa, which area was extremely tender and rigid. It was noted that the right testis had failed to descend and that the right side of the scrotum was under-developed, but to this fact no particular significance was attached.

Operation.—A diagnosis of acute appendicitis was made and immediate operation carried out, the abdomen being opened by a right Battle's incision. When the peritoneum was opened some free fluid—slightly blood-stained—escaped. The parietal œdema which I had noted in previous cases was not here observed. On seeking for the appendix a large mass was felt and easily delivered into the wound. This proved to be a mass of twisted omentum, purplish in colour, with an abdominal testis attached to its lower end. The whole mass was removed without much difficulty, but in the course of manipulation the adhesion of the omentum to the testis, which I was most anxious to preserve, unfortunately gave way, spoiling what would otherwise have been an unique pathological specimen. The abdomen was closed in the usual manner. The patient made an uneventful recovery and was discharged from hospital on March 3rd, 1928. There was no hernia in this case.

7. *Author's case*, a male, aged 44, was admitted to the North Middlesex Hospital at 4 P.M. on August 25th, 1926. He had been awakened from his sleep in the early hours of that morning by acute abdominal pain. He had vomited, and taken some brandy. This had failed to give relief and had made him vomit again. The pain had been very severe, and felt mainly across the lower abdomen; later it had seemed to settle in his right side. He stated that he had suffered from abdominal pains from time to time, but never anything so severe as this—never severe enough to make him lie in bed. His bowels were regular and had been opened on the previous day.

He was a tall spare man, who looked ill. His temperature was 102·8° F., and his pulse-rate 128. The abdomen was slightly distended, and did not move well on respiration. Definite tenderness and rigidity were present in the right iliac fossa and right para-umbilical region. The hernial orifices were clear, and there was no history of rupture. On rectal examination there was slight tenderness on the right side of the pelvis. The lungs were clear and the heart sounds weak. A diagnosis of acute appendicitis was made.

Under anæsthesia it was thought that a lump could be felt in the right iliac fossa, but this was so doubtful that I did not further consider it. The abdomen was opened by a muscle-splitting incision. The peritoneum looked dark and œdematous, and blood-stained fluid escaped on incising it. Immediately underneath lay the omentum, darkish-red in colour, adherent to the parietal peritoneum, the cæcum and the appendix. It separated easily from the parietes, and its adhesion to the cæcum and appendix was so light that when all three were delivered from the abdomen it had become almost completely detached from the other two. The appendix was swollen and acutely inflamed. For the moment it was covered with an abdominal pad and laid aside. On further withdrawing the omentum from the abdomen it was seen to have twisted upon itself several times. The twists were undone; as many as ten were counted, and even then the pedicle did not seem to be completely unrolled. The pedicle was ligatured and the twisted omentum removed. Appendicectomy was performed. Swabs on holders were passed down to the pouch of Douglas, and some odourless blood-stained fluid mopped out. The abdomen was closed without drainage. The appendix contained muco-pus and a large concretion; its mucous membrane was hæmorrhagic (see Figure).

The patient made an uneventful recovery, but remained in hospital six weeks for treatment of his cardiac condition.

A year later he met with a fatal accident, and Dr. A. W. Gregorson, assistant superintendent, North Middlesex Hospital, who performed the post-mortem examination, was kind enough to supply me with some details. "There was little trace of the great omentum except some vestiges near the splenic flexure. The cæcum was mobile and the peritoneum smooth at the site of operation. The liver was enlarged from the back pressure of a heart diseased in its valves and in its myocardium. Death was due to multiple fractures and a fracture of the base of the skull."

Treatment.

The treatment is removal of the twisted omentum at the earliest opportunity. No special difficulty attaches to the operation, and there is no recorded mortality in cases that have been operated upon early. It is on record that the twists have been undone and the omentum replaced, but such treatment is not to be advocated. If the strangulated part be viable the danger of recurrence is too great to be risked, as evidenced by the marked tendency of the omentum, even after removal, to resume its original twisted position. (See accompanying Figure.)

Author's case. Drawing of specimen made by Mr. W. T Shiels. Actual specimen measured 14 × 9·4 × 3·5 cm.

The main features of the case may not, in spite of careful consideration, lead to correct diagnosis, but they should at any rate determine that an exploratory operation be undertaken. A paramedian incision, with displacement of the rectus muscle outwards, is on the whole the best, for it allows of easy extension upwards or downwards, gives access to the majority of abdominal viscera, and rarely gives rise to subsequent weakness of the abdominal wall. It is an incision to be more strongly recommended than the pararectal, with displacement of the muscle inwards, for while the latter as a rule gives good access to the appendix it is not without its disadvantages. In the event of its extensive enlargement upwards or downwards, nerves get in the way and, even if recognised, may be damaged, with consequent weakness of the rectus or, in some cases, ventral hernia (Sherren).

There is strong evidence in favour of a recurrent or chronic condition of torsion of the omentum. If exploratory laparotomy be done to clear up recurrent attacks of vague abdominal pain, suspicion may not unnaturally be directed to the appendix, particularly if operation be carried out during a quiescent interval. The omentum should not be forgotten in the routine examination of the viscera, and any suspicious abnormality affecting it should be dealt with. Timely intervention will anticipate the possibility of acute torsion, and help much more towards the relief of pain in such cases than simple removal of a doubtful appendix.

I am indebted to the surgeons of the London Hospital; to Mr. C. J. MacAuley, surgeon, Mater Misericordiæ Hospital, Dublin; and to Mr. Spencer Mort, medical superintendent North Middlesex Hospital, for permission to publish these cases.

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BENZYL-CINNAMATE TREATMENT OF PULMONARY TUBERCULOSIS.

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THE remarkable radiological improvement that has been noticed is the main reason for the following account of the treatment of cases of pulmonary tuberculosis with benzyl-cinnamate injections.

Method of Treatment.

Benzyl cinnamate ($C_9H_7O_2C_7H_7$ ($C_6H_5CH.CH.COOCH_2C_6H_5$)), a natural constitutent of balsam peruvianum, is given by us as a 1 per cent. solution in olive oil. We inject 5 c.cm. intramuscularly in the usual site—namely, about 2 inches to 3 inches below the iliac crest—commencing laterally and giving successive injections slightly nearer the middle line. Injections are given daily for 12 days, followed by a fortnight's intermission, then 12 more daily injections, another fortnight's rest, and 12 more injections. Then after an intermission of about six weeks the three series of 12 injections are repeated. A rest from treatment of about three months is followed by a further six series or courses of injections exactly as the first six. The following is the method of preparing the solution carried out by Mr. Rea, dispenser at the Chest Hospital.

Owing to the volatile nature of benzyl cinnamate it is necessary to sterilise the olive oil before the medicament is dissolved in it. This is done by heating 50 c.cm. of the oil in 100 c.cm. flasks at a temperature of from 120° C. to 130° C. in a dry air steriliser for two hours. The necks of the flasks should be plugged with a wad of sterile wool wrapped in gauze. It is taken for granted that the benzyl cinnamate itself is sterile. It is solid at normal temperatures, but may be readily liquefied by immersing the container in a water-bath. The requisite amount is then weighed into

a sterile measuring flask, and a sufficient quantity of the cooled olive oil added to make a 1 per cent. solution. Finally the solution is filled into 5 c.cm. sterile ampoules by means of a 20 c.cm. serum syringe.

The Table shows the result of the treatment in 16 cases. We have since added further subjects to

Case.	Courses of injections.*	Duration of phthisis in years before treatment commenced.	Result of treatment.		
			General condition.	Weight in lb.	X ray report.
1	7	7	Imp. + +	Same.	Very marked imp.
2	5	10/12	Imp. + +	+ 14	Marked imp.
3	3	6/12	Imp. ±	+ 4	Imp. l. lung; r. lung unch.
4	1	4/12	Died.	—	—
5	6	1	Imp.	Same.	Much imp.
6	6	5	Imp.	− 4	Definite imp. but suspicion of new cavity.
7	3	3	Imp. ±	Same.	Slight imp.
8	1	1	Died.	—	—
9	1	2	Died.	—	—
10	1	2/12	Died.	—	—
11	3	2½	Imp. + +	+ 5	Very much imp.
12	1	1	Imp. + +	+ 8	One radiogram only.
13	6	3/12	Imp. + +	+ 42	Very marked imp.
14	3	11/12	Imp. ±	+ 14	One radiogram only.
15	2	10	Died.	—	—
16	3	1	Imp. + +	+ 29	No change.

* One course = 12 injections.

The duration of phthisis is estimated from the history of the date of onset of typical symptoms. Imp. = improved or improvement. Unch. = Unchanged.

our list but have not yet had time to assess their progress. The treatment has been carried out under the not ideal conditions of a hospital in the centre of a large city. The method appears safe, practically painless, easy, and cheap. It is not advisable to give this treatment in renal cases; in one patient recently the renal condition became worse after the injections. Because the treatment was stopped the case has not been included in the results.

Results.

Almost all the in-patients at this hospital, with the exception of those sent in for diagnosis, have advanced phthisis, and all the cases dealt with in this article, with one exception, were in this category. The exception, No. 12, was attending a clinic with a fairly quiescent type of phthisis when she developed a large pleural effusion. She was immediately aspirated on admission, and improved rapidly, the improvement continuing on the benzyl-cinnamate treatment.

Five patients died. Four of these, Nos. 4, 8, 9, and 10, were so ill on admission that their death was a matter of early expectation. None of them had more than one course of injections—i.e., 12—and in two cases they were so ill that they could not be moved to the X ray room. The fifth case (No. 15) was of ten years' duration, was complicated by gall-stones, and was mentally unsatisfactory. He had only two courses of injections. It may be assumed that with none of the patients who died was it possible to give a fair trial to the benzyl-cinnamate treatment.

The remainder of the cases (and all cases were chosen completely at random) showed evidence of considerable benefit from the injections. Cases 1, 2, 5, 11, and 13 showed marked radiological improvement. Cases 3 and 6 showed definite X ray evidence of some improvement. Case 7 showed slight improvement. Case 16, in the 13 weeks she has been in hospital, has not yet shown X ray evidence of change, but has put on 29 lb. in weight. Case 1, with a history of four years' active phthisis, was extremely ill, and has shown remarkable clinical improvement. She has been able to leave the hospital, and is now continuing treatment as an out-patient. Cases 2, 13, and 16 have also shown remarkable clinical improvement. Cases 3, 5, 6, 11, 12, and 14 have also improved clinically, but to a lesser extent. In Case 7 clinical improvement is doubtful. Cases 2, 3, 12, 13, 14, and 16 have increased in weight, most noticeably 2, 13, and 16.

The amount of sputum generally showed an increase at the commencement of treatment, with a subsequent decrease. No consistent effect was noticed during the treatment of these cases on the presence of tubercle bacilli in the sputum or on the temperature or blood pressure. It will be seen: (1) That usually at least three courses of injections were given before any definite improvement resulted. (2) That increase of weight has occurred principally in those cases of no longer duration than 12 months. (3) That definite clinical and very remarkable radiological improvement can be accomplished, even in very toxic and extensive and long-standing phthisis, such as we have had to deal with.

Our thanks are due to Mr. J. H. Mather, the hon. radiologist, for the valuable help he has given us.

A STUDY OF YEASTS

BY THE COMPLEMENT-FIXATION TEST.

By Kenneth Stone, M.D. Oxf., M.R.C.P. Lond.,

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Between 1928 and 1930 a combined investigation was carried out at St. Bartholomew's Hospital, under the Rose Research Fund, with a view to obtaining evidence bearing upon the ætiology of lymphadenoma. In the course of this study an attempt was made to ascertain whether a mycotic infection is present in this disease, and a special search was made for the presence of micro-organisms of the yeast and sporothrix groups, by making cultures on Sabouraud's medium of affected glands and other tissues. As is well known, yeasts and yeast-like organisms occur on various vegetables in nature, are met with in air, and grow very readily on Sabouraud's medium. Differentiation is at present achieved principally by study of the cultural, morphological, and biochemical characters, with a result far from convincing. An attempt has accordingly been made to apply serology for this purpose, employing the complement-fixation test.

Previous attempts have been made to investigate the serological behaviour of different strains of yeasts, but no practical method of classification appears to have resulted. Schütze[1] in 1903, was unable to distinguish by agglutination and precipitin reactions the yeasts he investigated—certain yeasts employed for fermentation, and yeasts from corn and potato. He succeeded[2] in 1911 in differentiating the same organisms by the complement-fixation reaction. Lichtenstein,[3] in 1914, found that he could distinguish various kinds of saccharomyces and differentiate the torula group from the saccharomyces group by means of agglutination. Balls,[4] in 1925, found the precipitin method well adapted for use in differentiating between closely related species of yeasts and in showing relationships which are not brought out in the ordinary botanical classification. For the precipitin reactions in these investigations a yeast autolysate was used as antigen.

Mueller and Tomcsik [5] showed that extracts of many species of bacteria, prepared in such a way as to be as free as possible from coagulable proteins, contain substances which specifically precipitate with homologous immune sera and which produce skin reactions of the tuberculin type in infected animals, but do not induce antibody formation on repeated administration to rabbits. In 1914 they found that a similar "residue antigen" can be prepared from yeasts. The active material is a complex carbohydrate —"the yeast gum." Tomcsik,[6] in 1930, investigated the specificity of reactions obtained with this yeast gum. He studied 13 yeasts, 3 isolated from throat secretions from cases thought to be diphtheria, and 10 of the saccharomyces group. By cross-precipitation test five saccharomyces strains were apparently identical, whereas the remaining five were distinct. The results of complement-fixation tests were practically identical with those of the precipitin tests. Further, it was found that the results of agglutination tests, using suspensions of the yeast cells, were identical with those obtained by precipitin and complement-fixation tests using the yeast gum.

TECHNIQUE OF PRESENT INVESTIGATION.

1. *Preparation of sera.*—The sera used were prepared by Dr. Mervyn Gordon as follows: a full growth of the yeast on one slope of Sabouraud maltose agar was suspended in 10 c.cm. of saline and heated at 65° C. for 30 minutes, and 0·5 per cent. of phenol was added. Rabbits were injected with rising amounts of this suspension at weekly intervals for five weeks. Samples of serum were taken before each injection and compared. It was usually found that the best serum was obtained after four or five doses. With some yeasts a low titre serum only is obtained by this method; in these cases injections of the living organism may be successful.

2. *Complement-fixation technique.*—A quantitative test was used throughout, for only in this way can group fixation be detected; this was realised by determining the highest serum dilution at which the reaction was obtained. The technical details described in the *British Journal of Experimental Pathology* (1923, iv., 318) have been followed with minor differences of detail. In the early stages of the work the antigen used was a simple saline suspension of the organism. Experiments, however, showed that a saline washing of the yeast gave as strong reactions as the saline suspension, and that much sharper end-points were obtained. The work to be recorded was therefore carried out with antigens prepared in this way: the growth on one slope of Sabouraud maltose agar (age variable) was suspended in 10 c.cm. of saline; the suspension was allowed to stand for about five minutes, then centrifuged at high speed. The resulting clear supernatant fluid was pipetted off and used.

3. *Absorption tests.*—A suitable saline dilution of the serum to be absorbed was treated with a strong suspension of the yeast and the mixture incubated in the 37° water-bath for two hours. After centrifugation at high speed for one hour the upper layers of the supernatant fluid were removed and tested by the usual technique. It was found that absorption tests presented considerable technical difficulties, and so far they have proved satisfactory with thrush serum only. They could not, therefore, be used as a routine.

RESULTS.

1. *Identity of different strains of thrush.*—Cultures of the thrush fungus (*Oidium albicans*) were isolated from the throats of ten successive cases of the disease, and tested with a serum prepared against one of these strains. All specimens gave identical results, reacting to titre with this serum. The type of yeast most frequently obtained from lymphadenoma material, Type I., gave considerable group fixation with anti-thrush serum. The reaction was constantly found to be to half the titre of the homologous reaction. It was, therefore, important to show whether or not these organisms are distinct serologically by absorption of complement-fixing antibodies. Table I. records the results of such an absorption test. It will be seen that the thrush organism almost completely removes the antibodies from the thrush serum; absorption with the Type I. yeast produces a slight diminution only in this reaction. This result has been obtained repeatedly with another thrush serum.

None of the yeasts from lymphadenoma material (with the sole exception of an organism obtained by culture of a pharyngeal swab from one patient), from control material, or from the air, and none of the specimens from the National Collection of Type Cultures reacted to titre with thrush serum.

TABLE I.

Antigen.	No serum.	*Thrush serum unabsorbed.*				
Nil ..	—	—	—	—	—	—
Thrush ..	—	++	++	++	+	—
	A.C.	25	50	100	200	400
		Thrush serum absorbed by thrush.				
Nil ..	—	—	—	—	—	—
Thrush ..	—	+—	—	—	—	—
	A.C.	25	50	100	200	400
		Thrush serum absorbed by yeast, Type I.				
Nil ..	—	—	—	—	—	—
Thrush ..	—	++	++	++	—	—
	A.C.	25	50	100	200	400

++ = Complete fixation. + = More than 50 per cent. fixation. +— = Less than 50 per cent. fixation. — = No fixation. A.C. = Antigen control.

Many yeasts gave little or no reaction with thrush serum and, with the exception of Type I., none gave more than a moderate group reaction. A simple complement-fixation test is therefore sufficient to differentiate thrush from all the yeasts we have studied, with the exception of Type I. This is readily distinguishable by an absorption test.

2. *Seven serological types so far determined.*—The yeasts studied have been obtained from lymphadenoma material, control material, and from the air; in addition, the following known pathogenic yeasts and yeast-like organisms have been studied: (1) thrush; (2) eight specimens of pathogenic yeasts from the National Collection of Type Cultures; (3) the sporothrices of Beurmann, Schenck, Gougerot, and Jeanseln. When submitted to the complement-fixation test the following organisms were found to be serologically distinct: (I.) Darbyshire: yeast from lymphadenoma gland; (II.) Thrush; (III.) Torula Stoddart: No. 5 from the National Collection of Type Cultures; (IV.) Skipp, A.: a *black yeast* from lymphadenoma gland; (V.) Barber: yeast from lymphadenoma gland; (VI.) Rowe: yeast from lymphadenoma gland; (VII.) Beurmann's sporothrix.

Table II. shows the results of cross tests with these seven organisms and the corresponding sera. The titre of the reaction with the homologous organism is given and a definite group reaction is indicated. o=little or no reaction.

With but three exceptions, which remain for the present unclassified, all the yeasts studied (58, including 10 strains of thrush) fall into one or other of these seven groups, reacting to titre with one or other of the seven sera.

Twenty-one lymphadenoma yeasts fall into five groups—namely, I., III., IV., V., and VI., 12 of them belonging to Type I. Twenty-four of the yeasts studied belong to this type, which contains three yeasts from the National Collection, several from cultures of control material, and two obtained from the air. In the group of *black yeasts* (Type IV.) are two organisms isolated from lymphadenoma tissues. Six black yeasts were tested and all were found to be identical. They include a yeast obtained from a

novocain bottle, and the sporothrices of Gougerot and Jeanseln. Type III. (Torula Stoddart) contains no yeasts obtained from control material. It is composed of two lymphadenoma yeasts and five other specimens of pathogenic yeasts from the National Collection of Type Cultures. Type V. is that of a yeast isolated from a case of lymphadenoma, which has proved to have pathogenic properties of considerable interest. Two other lymphadenoma yeasts and two specimens from control material belong to this group. Type VI. consists of two specimens only, both obtained from lymphadenoma cases.

TABLE II.

Yeast.	Serum—						
	I.	II.	III.	IV.	V.	VI.	VII.
I.	Titre 400	Group.	0	Slight group.	0	0	0
II.	Group.	Titre 400	0	0	0	0	0
III.	0	0	Titre 200	0	Group.	0	0
IV.	0	Group.	Group.	Titre 1600	0	0	0
V.	0	0	Slight group.	0	Titre 800	0	0
VI.	0	Slight group.	,,	0	0	Titre 1600	0
VII.	0	0	,,	0	0	0	Titre 200

I., Darbyshire; II., Thrush; III., Stoddart; IV., Skipp. A.; V., Barber; VI., Rowe; VII., Beurmann.

3. *The sporothrices of Beurmann and Schenck.*—No yeast was found to react with an antiserum to the sporothrix of Beurmann; this organism is therefore quite distinct from members of the yeast group so far studied. It is worthy of note that by the complement-fixation test the sporothrix of Schenck is indistinguishable from that of Beurmann.

CONCLUSIONS.

1. By using a saline washing of the yeast as antigen the complement-fixation test can be applied in the identification of various members of the yeast and sporothrix groups. (2) Specimens of thrush (*Oidium albicans*), obtained from ten successive cases, gave identical results. By the complement-fixation test all belong to one serological type. (3) Specimens of yeasts obtained from other sources have been studied, and are shown to fall into five types. (4) The sporothrices of Beurmann and Schenck appear to be identical, and quite distinct from yeasts so far studied. The sporothrices of Gougerot and Jeanseln appear to be identical with black yeasts obtained from other sources.

The work was carried out under the direction of Dr. Mervyn Gordon. My thanks are due to him for permission to publish the results, and to his laboratory assistant, Mr. J. Haegerty, for invaluable practical help.

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CLINICAL AND LABORATORY NOTES

SEVERE DIPHTHERIA.

AN ACCESSORY METHOD OF TREATMENT.

BY B. A. PETERS, M.D. CAMB.,

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THE accessory method of treating diphtheria which is here outlined has been tried on 730 cases during a severe epidemic with encouraging results, the death-rate being only 2·3 per cent., exactly half that of the immediately preceding 600 cases. It is based on the theory that diphtheria toxin (like other true toxins) acts as a positively-charged colloid, causing flocculation or gelation of the blood and tissue proteins, and that the pathology of the disease is, at least in part, explicable by the collection of these floccules in the capillaries of important viscera. We think we have confirmed this theory by the dark ground examination of capillary serum in severe cases. Antitoxin only neutralises toxin; it does not restore the floccules to their normal state of dispersion and electrical charge. The use of peptising agents (as suggested by McDonagh's work) would be a reasonable method of overcoming this.

In severe cases in addition to the administration of full doses (30,000 to 40,000 units) of antitoxin, of which part is given intravenously, 5 to 7 ounces of 20 per cent. glucose solution is given intravenously on admission. This produces an immediate improvement in the patient's condition. Occasionally a rigor may follow its use, but this never seems to do harm. The patient is also given one or two doses of contramine (0·125 g.) intramuscularly on succeeding days. The following mixture is given four-hourly by mouth until the urine is alkaline to litmus: sod. bicarb., grs. 30; pot. bicarb., grs. 5; calcii carb., grs. 7½; aq. menth. pip. to one ounce. Four to eight grains of thyroid are given daily and 20 minims of tinctura iodi mitis by mouth in milk four-hourly. These two drugs are given until the urine is free of albumin; this sometimes takes three or four weeks. These drugs are extremely well borne, and no evidence of intoxication has shown itself, if the albuminuria is taken as a guide. If the patient is inclined to vomit in the second week the subcutaneous injection of a pint of 3·6 per cent. glucose will usually check it.

The treatment in our hands has undoubtedly saved a number of desperately ill patients, and appears to diminish the more deadly forms of paralysis. No fatal case of diaphragmatic paralysis has occurred in this series. The preceding 600 cases provided four such cases, although many of these received intravenous serum. The intravenous injections are sometimes difficult, and frequently need the exposure of a vein under 2 per cent. novocain. We are using two 20 c.cm. record syringes, which are filled and attached alternately to the needle in the vein. In the early stages of diphtheria the blood clots very rapidly in the damaged vein, so that the addition to the glucose of sodium citrate (grs. 5 to the ounce) is an advantage.

A NOTE ON SEPTIC CARRIERS.

BY LACHLAN GRANT, M.D., C.M., D.P.H. EDIN., F.R.F.P.S. GLASG.,

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A COMMON group of diseases with which medical practitioners have to deal is that of boils and local inflammatory and pustular skin infections, which occur more particularly on the fingers, hands, wrists,

forearms, back of the neck, and other skin areas, and at the nasal orifices. In other papers [1] I have fully discussed the probability that some of these troublesome and painful local infections result from the daily use of the present type of toilet and wash-hand lavatory basins. Most people wash their hands and faces several times daily in stationary water contained in the common unsterilised basins. They deposit in this water and on the walls of the basin the dust and dirt particles from the skin surfaces, which carry minute harmless or harmful "bacterial passengers." By the usual bacteriological methods these latter can be shown to be present in the polluted basins. It is thus plain that by washing in such a concentrated, contaminated fluid-medium, any micro-organisms present are applied and reapplied, again and again, to the washed (?) surfaces of the parts usually supposed to be correctly and properly cleansed. The result is that they are, to a large extent, deposited on the towels during the wiping and drying process. All this is surely quite unhygienic and insanitary. After such washings it is little wonder, whenever we get a wound of the skin, an abrasion, or an epilated hair leaving an open follicle, that staphylococcal, streptococcal or other pathogenic organisms frequently enter the open and exposed injured surface. These may then set up the complete infective and inflammatory process. At any rate, one must admit there is every possibility of this happening.

RECURRING BOILS.

Recently instances have been noted where several members of the same family suffered at intervals from recurring boils, or a too-ready inflammation of even simple wounds sustained in the course of the day's work, and it naturally occurred to me to go more fully into the medical history. In several instances an obvious origin for these inflammatory repetitions was soon apparent.

In the case of two patients from the same household, both of whom suffered within the past three years from numerous boils, several wrist infections—one of a severe type with abscess formation necessitating incision, following a transverse wound of the wrist—I found that the mother had a long-standing, chronic and open varicose ulcer of the lower leg, about 2½ in. by 3½ in. in size. In another male case with persistent periodic boils, it was discovered that the mother had a large, chronic, septic leg sore. These two poor and middle-aged women informed me they were quite distressed at their sons' frequent loss of work and wages through boils and abscesses which developed, in spite of repeated morning saline laxatives, a common method of prevention in many families. They did not realise that their own unhealthy integumentary systems were the likely carriers and distributors of the virulent organisms which caused these periodical infections; cultures from the chronic ulcers gave the usual staphylococcal growths.

In the treatment of these cases prophylactic aseptic daily cleansing by every member of the family was advised, and special mention was made of downward flushings from an elevated water tap. With one patient, in whose house no gravitation water-supply was laid on, the difficulty was overcome by washing at a nearby water spout—a natural running tap. Clean towels and garments were also recommended and, subject to careful local and general attention, with the occasional exhibition of a polyvalent staphylococcal vaccine, the boils and inflammations were cured, and for the past year there have been no recurrences. Meanwhile, with the aid of prolonged rest for the mothers, the open ulcers have responded to suitable treatment. It ought to be of interest to state that the men affected were outdoor manual workers, liable to abrasions and other surface injuries.

HAND-BASIN CONTAMINATION.

This note is published with the suggestion that when these suppurative inflammatory infections persistently recur, and where there is no systemic condition such as glycosuria or a chronic furuncular state and where, in spite of pure water cleansings, success is not achieved, it might be helpful to make fuller and tactful inquiries in order to discover if there is not some carrier or harbourer of septic conditions in the home. Similar casual inflammatory attacks in families may also result from the presence of septic teeth, chronic sinusitis, tonsillar infections, otitic abscesses, leucorrhœal discharges and furuncular conditions generally. It is obvious that pus from patients suffering from such diseases must daily enter the wash-hand basins, contaminating them and rendering them bacteriologically unclean. Against infection from such sources the only effective precaution is to avoid washing in the stationary fluid, and to use pure running water for all the daily ablutions. This can be easily carried out by using a combined elevated hot and cold water tap with a spray or single medium-sized jet inlet. Such modern and improved water faucets have already been fully described by the writer in previous articles.[2] Towels can always be boiled, but the sterilisation of every wash-hand basin after each usage is an absolute impossibility.

Hence the necessity for the raised flow as a simple preventive remedy for these and other largely avoidable organismal infections. By the downward flush the dust and dirt particles, harbouring the pathogenic bacteria, are carried off direct to the waste and soil pipe. In this way there is no reapplication of any infected microscopic suspended matter. This method is so obviously correct that it seems almost incredible that such faucets are not installed forthwith in every home and institution where gravitation water is laid on. Instead, the old-fashioned, primitive and dangerous toilet and lavatory basins, with their close-up taps, are being used and fitted for washing in the stationary water. This, as already pointed out, favours the direct application of any aggressive bacteria present, not only to the half-cleansed skin areas but to the naso-oral orifices as well. These microbic organisms, being "considerately" rubbed in during the cleansing processes, tend to inoculate the system, and any wounds or abrasions of its cutaneous surface, with the possible risk of subsequently setting up one of the acute or chronic, local or general infectious diseases.

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GONORRHŒA IN THE FEMALE CHILD.

SOME POINTS IN TREATMENT.

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In treating gonorrhœa in female children it is difficult to obtain an even and thorough application of a lotion or paint to the mucous membrane of the

urethra and vagina, and I believe that quite a number of so-called relapses during treatment are due to inadequate lavage of the mucosa with the antiseptic

FIG. 1.

Large cannula for vaginal douching. Small cannula for urethral irrigation.

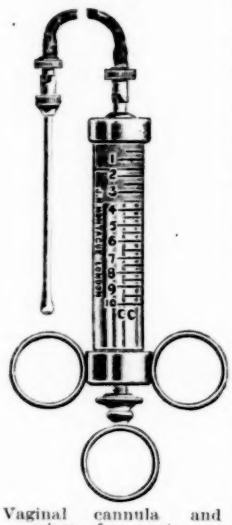
FIG. 2.

Urethral cannula and record syringe.

in use. The cannulæ here illustrated were designed to facilitate thorough application of lotions, paints, and the like to the child's urethra and vagina—particularly in gonococcal infections.

The urethral cannula is probe pointed at one end, while the other end receives a small nipple fitting. When in use 8 inches of narrow rubber tubing fitted with a male nipple connects the cannula with a stop-cock in the tubing of an ordinary irrigation jar (Fig. 1). The cannula is introduced into the urethra *with the lotion flowing*, and the stream is maintained while the cannula moves gently up and down the urethra. If it is desired to leave some of the lotion in the bladder to flush out the urethra when voided naturally later on (a method often used in adult women) it is only necessary to pass the cannula on into the bladder, the stream of lotion being continuous.

FIG. 3.



Vaginal cannula and syringe for pastes or viscid materials.

For paints such as solutions of silver nitrate a 1 c.cm. record syringe replaces the stop-cock in the rubber tubing (Fig. 2). In this case the unattached cannula is passed through the urethra until its probe point enters the bladder, as shown by the appearance of a few drops of urine at its other end. The cannula is then withdrawn into the urethra just sufficiently to prevent the escape of urine. The syringe, narrow tubing, and nipple are charged with the paint or application, and the nipple is attached to the cannula, which is already in position. As the syringe is slowly emptied the cannula is very gradually drawn along the urethra and out. The syringe must be filled with the narrow tubing attached, as otherwise the solution is simply expelled into the empty rubber tubing and only air reaches the urethra.

The vaginal cannulæ are of two varieties: one with a spray nozzle for douching (Fig. 1), and the other with a wide-bore aperture for the introduction into the vaginal fornices of viscid materials—e.g., 2 per cent. flavine in glycerin (Fig. 3). This last cannula is connected with a 10 c.cm. syringe by narrow tubing fitted with nipples, the nipples in this case having bayonet catches.

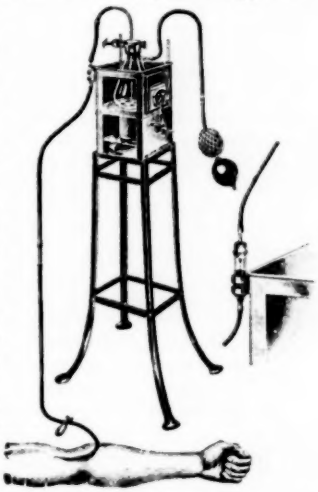
In using these instruments 8 inches of narrow tubing should intervene between the cannula and the supply of lotion. The introducing hand must rest firmly against the buttock. Should the child make any unexpected movement, cannula, narrow tubing, and hand of operator all move with the buttock, thus avoiding any risk of injury. The passage of these cannulæ into the urethra or vagina of a child causes little, if any, discomfort, and enables a complete antiseptic treatment to be given.

My thanks are due to Mr. Hugh Lett for allowing this work to be done in his department. The instruments are made by Mr. J. H. Montague, of 69, New Bond-street, London, W., and may be obtained singly or as a complete outfit.

NEW INVENTIONS

A PORTABLE THERMOSTAT FOR BLOOD TRANSFUSION.

THE apparatus here illustrated is on the principle of the Wassermann bath and its function is to keep the blood at the correct temperature throughout the operation of blood transfusion. The injection of blood at too low a temperature tends to produce pyrexial reaction and myocardial embarrassment, with undue post-transfusion sweating. Moreover, if the flask is immersed in a basin and kept warm by renewing the surrounding water, this operation becomes tiring to the nurses and inaccurate in its effects. The thermostat simplifies all this. The apparatus can be adjusted for any required temperature, but it is usual to work with it at 40–42° C. so as to allow a drop of 2° C. from the apparatus to the recipient. To summarise, the advantages are as follows. 1. One, if not two, assistants are dispensed with. The whole transfusion can be carried out unaided if necessary. In private work the apparatus is easily portable and invaluable. 2. The blood is guarded from disturbance. 3. It arrives at the patient at the right temperature constantly throughout the transfusion, however long. 4. Reactions become negligible, assuming that the cross test has been carried out properly; cardiac reactions are abolished, pyrexia is reduced to practically nil, whilst rigors become rare and of the mildest possible type, if present. For private work the oil burning type is recommended, but for institutional use the electric type is preferable.



The apparatus is supplied by Messrs. Charles Hearson and Co., of 27, Mortimer-street, London, W., and also by Messrs. Down Bros., St. Thomas's-street, London, S.E.

A. GEOFFREY SHERA, M.D., B.Chir.Camb.

REVIEWS AND NOTICES OF BOOKS

Liver in the Treatment of Pernicious and other Anæmias.

By S. C. DYKE, D.M. Oxf., M.R.C.P. Lond., Consulting Pathologist, The Royal Hospital, Wolverhampton. London: Jonathan Cape. 1930. Pp. 128. 5s.

THIS is a clear account of the liver treatment in blood diseases. After two concise chapters on the pathology of pernicious anæmia and the steps necessary for its diagnosis, a short history of the liver treatment is combined with a practical description of its details, including several recipes. In discussing liver extracts, the author points out that some of those on the market are useless, though others are potent. Other therapeutic agents such as hydrochloric acid and iron are discussed, and a preliminary transfusion is recommended for severe cases. Possible complications of the treatment are mentioned and the reticulocyte response is described. The methods suggested for an accurate reticulocyte count are somewhat cumbersome. Dr. Dyke clearly has no sympathy with the "toxic" theory of pernicious anæmia in any shape or form.

In secondary anæmia due to recurring hæmorrhage it is claimed that liver and iron together are definitely useful, being better than either alone. "Toxic" anæmia is not improved. According to Dr. Dyke sprue, the anæmia of pregnancy, and dibothriocephalus latus anæmia do well with liver; he quotes the successful results obtained by J. W. Pickering, who used this treatment in hæmophilia. The last chapter on the nature of the anti-anæmic principle describes E. J. Cohn's work on its purification so far as this has gone, and W. B. Castle's demonstration of the active principle in the normal stomach during digestion.

The book is easy to read and is written from a practical point of view.

Troubles des échanges nutritifs dans la tuberculose pulmonaire.

By R. MONCEAUX, Docteur-ès-Sciences, Lauréat de l'Académie de Médecine, Chef de Laboratoire à l'Hôpital Cochin. Saint-Cloud: Girault. Pp. 446.

Dr. Monceaux takes the view that in our pursuit of knowledge about the tubercle bacillus we are apt to neglect the study of the soil on which it grows. The 400 pages of his book are therefore devoted to an extensive study of metabolism as applied to tuberculosis, with little or no reference to the bacillus. Throughout the book the author chooses the physiological approach to the subject, and in many of his chapters gives an outline of the normal physiology of the organ under discussion.

The author divides the work into sections dealing with protein, fat, and carbohydrate metabolism, gaseous interchange and basal metabolism, the acid-base equilibrium of the blood, demineralisation and remineralisation, carotinæmia and liver function, whilst in the concluding sections he considers general questions of metabolism as they are affected by wasting in tuberculosis, by the results of open-air treatment, and by general hygiene. In the section on carotinæmia, a subject which is very little understood in relation to tuberculosis, or indeed to other diseases, Dr. Monceaux discusses the relation of the condition to cholesterinæmia and the failure of oxygenation. He does not give many quantitative analyses, but supplies adequate references. In the long section on demineralisation and remineralisation many views by many writers are quoted; the author sums up by the statement that the method of indirect calcification is the only rational and scientific therapy, but does not convince us that any simple solution of the problem has been achieved. Meanwhile, presumably, the clinician will continue to back his fancy in the way of drug treatment without too serious a regard for the biochemist, and as long as the laboratory findings are equivocal nobody can blame him.

The last section of the book is devoted to a general consideration of the therapeutics of tuberculosis viewed from the standpoint of the biochemical physician. Here Dr. Monceaux has pronounced views, which are contrary to those held by advocates of the Gerson diet in Germany, in favour of pushing the carbohydrate side of the diet rather than proteins and fats. It is a relief that the endocrines do not occupy that all-important place in the picture which we are beginning to associate with works on metabolism in tuberculosis. Several coloured plates illustrate lesions of the liver in tuberculosis, and an excellent bibliography is included; unfortunately, no subject index is supplied. The book is full of information, and in places both stimulating and provocative.

Diseases of the Nose, Throat, and Ear.

Medical and Surgical. Sixth edition. By WILLIAM LINCOLN BALLENGER, M.D., F.A.C.S., late Professor of Otology, Rhinology, and Laryngology, University of Illinois. Revised by HOWARD CHARLES BALLENGER, M.D., F.A.C.S., Otolaryngologist to the Evaston Hospital. London: Henry Kimpton. 1930. Pp. 1138. 50s.

Prof. W. L. Ballenger's work in rhinology is well known in this country and his text-book is therefore of especial interest to his British colleagues where it deals with the operations and methods of treatment which he has elaborated. The book is one of the larger works on the ear, nose, and throat, and is perhaps more useful as a work of reference for the specialist than as a text-book for the student and general practitioner. The operations, especially of rhinology and otology, are very fully discussed; incidentally, Prof. Ballenger's method of enucleating the tonsils with the guillotine, called by him the Ballenger-Sluder operation, is identical with that first described by Whillis and Pybus in this country in 1910. The weakest part of the book lies in the description of the clinical appearances of various diseases and in their differential diagnosis by inspection. This applies especially to the larynx; no one would recognise tuberculous laryngitis in its different clinical aspects from the short description here given, and the single illustration gives a very poor idea of the lesions usually found in this disease. The same criticism applies even more forcibly to syphilis, for this disease in the larynx is dismissed in just over one page and is not illustrated at all; although syphilitic laryngitis is uncommon nowadays a knowledge of the laryngoscopic appearances it presents is important in the differential diagnosis from other affections. The much commoner syphilitic manifestations in the fauces are described very briefly in under two pages; all these affections are grouped under chronic granulomata of the nose, throat, and ear

in one chapter in the section devoted to the nose and accessory sinuses. Indeed, the larynx in general receives rather scanty notice, and the œsophagus even less, malignant disease of the gullet being discussed in 20 lines. On the other hand, diseases of the ear and of the nose are treated very thoroughly, the operations on these regions being carefully described and illustrated, and these sections of the book deserve the highest praise. The proof-reading has not been very efficient; Krishaber's name is misspelt, a page on mastoidectomy is headed "simple thyroidectomy," and another on œdema of the uvula "edema of the vulva."

The Mind of the Savage.

By RAOUL ALLIER. Translated by FRED ROTHWELL London: G. Bell and Sons, Ltd. Pp. 301. 15s.

MEDICAL men, administrators and missionaries whose work takes them to those parts of the world inhabited by the simpler peoples ought to be equipped with more than professional skill in dealing with the inhabitants of the country where their work is found. Some knowledge of anthropology, particularly in its psychological aspects, should form part of their mental equipment. Prof. Allier has been for many years a student of primitive life and mind, and attempts to supply in this book the information necessary for appreciating the minds of savages or, as one ought to call them, simpler peoples. He follows very closely Levy Brühl and the French school in the theory that there is a very definite hiatus separating the civilised from the savage. According to this school the savage mind is pre-eminently non-logical, or pre-logical; it takes little note of the law of contradiction and is little able to remember new intellectual situations, although it possesses all the affective life and moral excellencies which civilised men have. Above all, the savage is regarded as overridden by magic, his life being terrorised by the magical systems which hold his mind in thrall. This conception is by no means generally accepted, and certainly English social anthropologists are not likely to endorse it. Moreover, in his very extensive studies of a subject calling for a knowledge of affective psychology, Prof. Allier has entirely ignored Freud's work in general and his work on totem and taboo in particular. Roheim also is apparently unknown to him. Since these works do attempt to bridge the gap between savage and civilised (and neurotic), theories which take no account of them are unsatisfying.

Tumeurs medullaires associées à un processus syringomyélique.

By Dr. N. JONESCO-SISESTI. From the Neurological Clinic of Prof. G. Guillain at the Salpêtrière. Paris: Masson et Cie. 1930. Pp. 295. Fr.45.

STUDENTS of neurology will welcome this fine contribution to our knowledge of a somewhat unusual yet well-recognised type of intramedullary tumour, which has its site almost always in the cervical or cervicodorsal region. With this tumour is associated a secondary gliosis or gliomatosis extending up and down the cord and, in its turn, exhibiting changes identical with those of syringomyelia as ordinarily understood. The monograph is based on five personal cases, to which are added, for purposes of comparison, the records of some 14 others obtained from the literature. On the clinical side, sensory and motor symptoms, irregular and asymmetrical, develop in areas corresponding to cervicodorsal segments, the former leading the way in most instances, and exhibiting a syringomyelic dissociation during early stages. Later, large areas of sensory loss are manifested, and a spastic paraplegia below with atrophic palsies above. Lower cranial nerve symptoms are exceptionally rare, even though bulbar prolongation of the gliosis is found post mortem. Pathologically, the tumours belong to the class of fibroglioma or of ependymoglioma, with an occasional teratomatous formation; these are enveloped by gliomatous hyperplasia which proceeds to spread up and down, and in which syringomyelic cavities may subsequently appear. In the spinal fluid an "albumino-cytological dissociation" is usual. The author describes in some detail a case in which noteworthy clinical improvement followed radiotherapy.

The Spirit of Chemistry.

By ALEXANDER FINDLAY, Professor of Chemistry, University of Aberdeen. London: Longmans, Green and Co. 1930. Pp. 480. 10s. 6d.

THE quotation on the title page of this work defines the author's intention, which is to introduce chemistry to those who require instruction in the science as an element of general culture rather than as a part of their professional or technical training. The quotation runs: "It is not the particular facts of a science that constitute its vitality, but the generic facts or conceptions to which they have elevated the mind. Facts are the body of science, and the idea of those facts is its spirit." The words are those of Samuel Brown, a medical graduate of Edinburgh University, who failed to obtain the chair of chemistry in his alma mater because of certain strongly held but fallacious views, but whose literary works are well worth consulting to-day. Along the lines thus laid down Prof. Findlay has written a sound book and one for which an increasingly large number of readers should be found, as it becomes increasingly necessary for others than those who are destined for a scientific career to understand at any rate something of a branch of science on which the development of modern civilisation is largely based.

The introductory chapter, setting out the aim and methods of science generally, and describing what is termed the twilight age of chemistry, is not here the usual perfunctory introduction allied to the throat clearing of the nervous orator; the passages which refer us back to the classic learning are closely related to all that follows, and explain the brilliant theorising with which the subtle but practical Greeks sought to solve the riddle of the universe. In essential truths their teaching, or guessing, was right, and where it was wrong we see that the errors were largely due to lack of the material equipment possessed by the modern researcher. But their wisdom was hidden from the world throughout the dark ages, while what natural philosophy was manifest during mediævalism was perverted mischievously by mysticism. Especially is this true of the development of chemistry from alchemy. The critical move forward is attributed by Prof. Findlay to Robert Boyle, "the kindly, lovable, courteous, and humble-minded nobleman and man of science," whose life is coincident with the latter half of the seventeenth century. Boyle may be regarded as one of the founders of the Royal Society, for he was a member of the "Philosophical College," styled "invisible" because it had no home until it blossomed into "the Royal" under the patronage of Charles II. Boyle's "Sceptical Chymist" marked the

close of the alchemist's sway and the birth of chemistry proper.

The fundamental laws of that chemistry are so clearly expounded by Prof. Findlay that a sound conception of the science can be obtained by any educated person who reads these chapters closely, particularly if he has some elementary training in physics and is sufficiently industrious to work out the calculations for himself. Probably only at the expense of such interesting labour will the necessarily complicated terminology be easy of remembrance. An automatic familiarity with the fundamental precepts—the great general "laws," usually eponymous, of physics, chemistry, and electricity—is not easily obtained by those with whom its acquirement has not been part of an undergraduate's education. The terminology revolts such readers, who regard its novelty as an added difficulty to their studies, whereas technical terms are the price of exact thought.

The lessons to be drawn from an essay on the three states of matter—a most important section of the book—are brought into line with the latest views by chapters on radio-activity, atomic constitution, and the determination of the atomic weights. The chapters demand and will repay attentive reading, for as their facts and arguments are assimilated an understanding will be gained of the essential concepts of modern chemistry. The connexion appears between the work of Dalton and Mendeléef and Greek theorising, looking backwards, while, looking forwards, we see how the grand contribution from radiology confirms and infinitely expands the discoveries of earlier physicists and chemists. Thus scientific spirit will be created in the reader. Such a spirit is stimulated by the author's plan of writing, whereby the critical discoveries, which were followed by immediate progress, are placed in historical settings, portraits and biographical details being given of the protagonists. So the long story becomes continuous and absorbing.

Die Hypertoniekrankheiten.

Second edition. By Dr. ESKIL KYLIN, Director of a Department of the General Hospital, Jönköping. Berlin: Julius Springer. 1930. Pp. 270. M.22.

Dr. Kylin's main contribution to his subject is the distinction of two forms of hyperpiesis—namely, essential hypertension (hyperpiesia), which is determined by a primary disturbance of vasomotor control, and acute glomerulo-nephritis, which he visualises as primarily a disease of capillaries following and due to infection, and widely distributed throughout the whole body. Whereas essential hypertension is, in its initial stages at least, a functional disorder, and only later leads to structural change in the vessels, glomerulo-nephritis is at its first onset a widespread disease of capillaries to which arteriole spasm is secondary. In the former the capillary pressure is unchanged, whereas in the latter it is raised. The histological changes in the arterioles and capillaries in acute diffuse nephritis are described in long extracts from descriptive observations made by Huckel on two cases, in one of which death occurred 30 hours and in the other 2½ days after the onset of acute nephritis.

In support of his view that the disease is essentially an acute infection of capillaries all over the body, Dr. Kylin refers to cases under his own observation, and others reported in the literature, in which a rise of blood pressure occurs several days before there is any sign of nephritis on examination of the urine; he also speaks of cases in which, in addition to the rise of blood pressure, there is an increase of body-weight due to œdema with normal urine, and of the rather doubtful cases of so-called acute nephritis, in which the whole course of the disease is run without albuminuria; and finally he emphasises his standpoint by giving the name Capillaropathia acuta universalis to the disease known as acute diffuse glomerulonephritis.

The introductory chapters on the physiology of arterial and capillary blood pressure, the methods of measuring these pressures, and their variations by day and during the passage of years, are well described, and the mechanism of hypertension is discussed in detail. The author is at pains to state the points on which he is in agreement or at variance with other authors, and he particularly discusses the relation of his views to those expressed by Prof. Volhard.

This monograph is written mainly from a theoretical point of view, and details of morbid anatomy and histology and of treatment of the diseases described are somewhat slight. But it forms an interesting study of the relation of hyperpiesis to hyperpiesia, acute and chronic nephritis, and chronic interstitial nephritis, and will be appreciated by those students of the subject who read German easily.

Les plexus choroïdes.

By Mme. Dr. NATHALIE ZAND. With a preface by Prof. Dr. G. ROUSSY. Paris: Masson et Cie. 1930. Pp. 140. Fr.22.

Dr. Nathalie Zand's monograph on the choroid plexuses comes at the right time. Various theories of humoral-neural interaction, of neural infection and defence, of nervous disease and nervous treatment, depend in part at least on the rôle played by meningo-vascular endothelia; hence anatomical and physiological prolegomena are indispensable. In this volume is succinctly set forth all that is known of these subjects; the author summarises it in the significant conclusion (among others) that the cerebro-spinal fluid is secreted by the choroid plexuses. She rejects the view which considers the arachnoid a serous membrane of two layers, declaring for its unity; the epithelium over the plexuses, moreover, is held to differ morphologically and physiologically from that of the ependymal cavities. In the connective tissue layers of the plexuses are arachnoid cells regarded by some as meningoblasts or meningocytes; Dr. Zand argues for their histiocytic nature, and assigns them to the reticulo-endothelial system with the function of ensuring absolute protection for the nervous system from substances dissolved in the blood. The latter third of the book deals at some length with the pathology of the plexuses, distinguishing acute and chronic lesions, and discussing changes in senility, in psychosis, and in the more ordinary diseased conditions of neurology.

A good bibliography is appended and there are a number of illustrations, but the book lacks an index.

SHEFFIELD ROYAL INFIRMARY.—A new casualty block at this hospital, which has cost £23,000, was unofficially opened last week. The building includes a dermatological department.

NEWCASTLE-ON-TYNE CITY MENTAL HOSPITAL.—Last year there was a steady increase in the number of patients of both sexes, and on one day in December last there were 1002 on the books, the largest number on record. The annual report of Dr. H. D. MacPhail, the medical superintendent, states that, although the general health of the patients was good, the number requiring continuous treatment in bed increased out of all proportion to the increase in the number of patients. Deaths numbered 71, a low rate compared with those of the preceding five years. The average daily number of patients was 996.

THE LANCET.

LONDON: SATURDAY, SEPTEMBER 13, 1930.

DIET AND GROWTH.

INTEREST in the best means of promoting the physical development of children was renewed in this country a few years ago by the investigations of H. C. CORRY MANN, who showed that an additional daily allowance of a pint of milk considerably increased the rate of growth of boys. By control experiments he showed that this enhanced rate of growth was not due to the correction of any absolute deficiency either in the total energy value of the diet or in the magnitude of its protein, carbohydrate, or fat content. The Scottish Board of Health later repeated the work and obtained very similar results; at the same time they observed that skim milk had almost the same stimulating effect on growth as whole milk. This observation apparently ruled out the possibility that the fat-soluble vitamins of milk might be concerned with the phenomenon, for skim milk has been proved to contain negligible quantities of these substances. It is possible to speculate concerning the nature of the factor or factors present in milk which bring about the increased rate of growth, and to suggest for instance that it may be the peculiar quality of the proteins, the mineral content, or some hitherto unrecognised water-soluble accessory factor; but no opinion about this can yet be expressed with confidence.

There is another method of investigation which might throw light on the nature of the common dietetic deficiency in childhood which can be corrected by a supplement of milk—namely, the method of statistical survey. Such a survey is reported by Dr. J. B. ORR and Miss M. L. CLARK in the present issue, and it is useful to compare its results with those they obtained by direct experimentation during their study of the effect of milk supplements on growth. The present survey consisted essentially of a careful record of the amount of food entering the homes of a series of Scottish families during the period of one week. Corrections were made to the figures thus obtained for probable wastage, and by the use of standard food tables it was then possible to gain some knowledge of the average total energy value and of the average quantity of protein, carbohydrate, fat, and mineral elements in the daily diet of the individuals concerned. The data thus collected indicated that according to recognised nutritional standards there was no widespread deficiency either in the total amount of food eaten or in the protein, carbohydrate, and fat contents of the diet. The mean daily consumption of calcium and phosphorus was above the figure put forward by H. C. SHERMAN as representing a safe allowance for maintenance, whereas that of iron was a little below SHERMAN'S corresponding figure. In so far as these diets are compared with accepted maintenance standards they appear to be adequate on the whole, though in some towns, and especially Dundee, a large percentage of the families investigated consumed less than the standard amounts both of protein and of mineral elements. It is commonly recognised, however, that the needs of growing children for individual foodstuffs may be greater than that of adults. When allowance is made for this fact in handling the data collected in this survey it seems probable that a significant proportion of the children whose diets were analysed were getting too little protein, calcium, phosphorus, and iron to permit of their optimum rate of growth. If this is true, at least a partial explanation of the stimulating effect of milk supplements on the growth of such children might be forthcoming, for milk is acknowledged to be a particularly valuable source of good protein and of calcium and phosphorus, though its iron content is insignificant. It may be remembered that CORRY MANN found little stimulating effect on growth as the result of giving protein derived from milk as a supplement to boys' ordinary diets. This observation does not necessarily rule out the possibility that a lack of good protein plays a part in the sub-optimal rate of growth of Scottish children. The proteins in the basal diets of the particular English boys studied might differ in growth-promoting capacity from those in the Scottish children's; moreover, the proteins of untreated fresh milk may be capable of stimulating growth more effectively than those obtained from milk by a precipitation process.

It is not claimed that this nutritional survey has afforded any new information on the chemical constitution of the diets best suited to promote growth in children. It does, however, tend to support the conclusions reached by CORRY MANN, and confirmed by the Scottish Board of Health, concerning the value of milk for growing children.

VISCERAL DECOMPRESSION.

Sir WILLIAM WHEELER in his address at Winnipeg on the significance of recoil following visceral decompression, an abstract of which appeared on p. 541 of our last issue, drew attention to a principle of the greatest importance to clinical medicine. Sudden increases in pressure, whether acting on the body as a whole or on any separate organ or system, are catastrophic in their results; if produced gradually they give rise to some of the most beautiful adaptations of which nature is capable; if maintained too long or increased unduly, adaptation fails and catastrophe follows, no less disastrous because it has been delayed. Conversely the sudden release of pressure of any degree may give rise to effects as unpleasant as those of pressure. It is seldom possible to relieve pressure as slowly as it has arisen, but Sir WILLIAM points to many instances where our methods of relief might be better graded with advantage to the patient. One of the most dramatic instances of the need for a gradual reduction of pressure,

which does not come within Sir WILLIAM's survey, is that afforded by caisson disease; others are the tense bladder of urinary obstruction and the distended bowel in chronic intestinal obstruction. Sir WILLIAM shows how the principle to which he has drawn attention applies to regions as diverse as the bowel, the liver, the urinary system, the spinal cord, and the eye; and while he does not discuss in any detail its application in the field of pure medicine, there are many obvious instances of its importance. In these times when the outlook of the general clinician is apt to be obscured by a wealth of important but sometimes bewildering laboratory detail, it is well to have his attention directed to certain broad general principles of physiology or pathology; such a survey, too, cannot but help the specialist to adjust the perspective of his own subject.

While Sir WILLIAM WHEELER's thesis is no new one, it has a particular value in his collection of instances of a pathological process acting in much the same way on whichever system or organ it affects, and in his insistence that treatment to be efficient must recognise the state which it aims to combat, and must be based on a general principle rather than on details of technique. Back-pressure, however produced, is one of the primary pathological states to which the body is subject, and whether it affects organs grossly or in more local degree, the principle still holds that the greater the tension the more gradual must be its relief. There can be little doubt that many of our present-day procedures for the relief of back-pressure are too rapid in their action and this is perhaps particularly true of operations for intestinal obstruction. The practice of emptying distended coils as rapidly as possible, by means of a tube passed along the bowel from an incision in it, is dangerous in direct proportion to its efficiency, and as Sir WILLIAM points out the cases of obstruction that do best are those in which a slow steady drain can be established through a small tube. Perhaps nowhere else is the danger so well seen as in pleural empyema, where the risks of acute pulmonary œdema or of flapping mediastinum have gradually taught the lesson of slow relief: in children especially, repeated slow aspiration is necessary before drainage if fatality is to be avoided. Instances of the importance of the effects of recoil following visceral decompression could be adduced whatever organ of the body is being considered, and we feel that Sir WILLIAM WHEELER is to be congratulated on having used his large clinical experience to illustrate a general principle of wide scope.

PHRENICOTOMY FOR PULMONARY TUBERCULOSIS.

IT might be an exaggeration to say that there is a stage in every case of pulmonary tuberculosis at which treatment by artificial pneumothorax would be curative, but it is certain at least that this treatment remains the method of choice for most cases diagnosed when the disease is still limited in area and confined to one lung. If complete deflation of the affected organ can be secured there is a reasonable prospect of cure. Treatment must, however, be commenced before adhesions have formed over the affected area and at a time when the lung is free to collapse. If the pleura is not free localised adhesions are drawn out as the lung retires from the chest wall. The resulting strings or bands maintain the patency of cavities which continue to act as incubators for the tubercle bacillus. Thus, though the unaffected portions of the lung, if well contracted, may be free from further danger, the integrity of the opposite lung is constantly threatened. If the bands are suitable for division by electrical methods effective collapse may still be maintained. If their extent or situation renders this impracticable, two further methods of treatment are available: the major operation of thoracoplasty or the minor operation of phrenic exairesis. The former imposes a severe psychological and physical strain, may be followed by acute suffering, and is not without risk to life. The latter, carried out under local anæsthesia, exposes the patient to negligible risks and makes no demands on his fortitude of mind or physical resistance. Section of the phrenic nerve was first proposed by E. STUERTZ, in 1911, for tuberculosis of one lower lobe. Disappointing results were obtained, however, by those who first practised nerve section. Accessory fibres, especially those arising from the fifth cervical nerve, provided collateral transmission of impulses and consequently in many cases the hemi-diaphragmatic paralysis was only temporary. In the modern operation an attempt is made to withdraw the whole nerve and if ten centimetres can be secured a permanent paralysis results.

The chronic fibroid type of pulmonary tuberculosis common in middle life is seldom seen in its early stages. The middle-aged working man pays little attention to a cough which causes but slight disability in the winter months and scarcely troubles him at all in the summer. It is only when increasing lassitude, severity of cough, or hæmorrhage interfere with his working capacity that he begins to suspect anything more than bronchitis. When at last he reaches th esanatorium, possibly half of one lung is densely fibrotic and excavated in its upper lobe, and though physical signs may be unilateral the radiogram will show very definite involvement of the opposite lung. Cases of this type are unsuitable for artificial pneumothorax treatment, and as a rule the patient has neither time nor patience for it. Thoracoplasty is still less applicable. A period of residence in a sanatorium teaches the patient how to take care of himself and how to avoid infecting others; there is some gain in weight, and cough and expectoration are lessened. On his discharge to his home a relapse is almost inevitable and death ensues within a few years. It is in cases of this type that phrenic avulsion may give very good results. Dr. R. W. MATSON has reported an excellent series,[1] and his article demands careful attention.

Dr. MATSON has obtained his best results in the proliferative or fibrotic type of disease. He considers

[1] Amer. Rev. of Tuberculosis, 1930, xxii., 1.

that in this type the capacity for collapse of the diseased areas of the lung is greater than that of the unaffected parts. Consequently, though the upper lobe is usually mainly affected, reduction in volume of the hemithorax enables the collapse capacity of the diseased lobe to exert itself. It is this collapse of diseased tissue, and not diaphragmatic stasis, which achieves benefit. The results of operation have been striking. Dr. MATSON quotes a series of 34 cases of the productive type of disease affecting the upper lobe. In each case artificial pneumothorax had failed and thoracoplasty was contraindicated by the condition of the less affected lung. In 52 per cent. of the cases the improvement following operation justified the hope of ultimate recovery. Tubercle bacilli were abolished from the sputum and the patients were able to return to work. In 38 per cent. there was definite improvement, but little prospect of permanent arrest. Dr. MATSON adduces further evidence in support of the modern teaching that phrenic avulsion should always precede thoracoplasty. He quotes a series of 32 cases of unilateral disease in which thoracoplasty seemed indicated. After phrenicotomy the number was reduced to 21. At the Winnipeg discussion (reported on p. 603) Dr. W. L. MANN also insisted on phrenic avulsion as a preliminary to thoracoplasty.

ANNOTATIONS

DEATHS FROM DIPHTHERIA.

ARE we making the best use of our knowledge of diphtheria? The question arises on perusal of the annual reports of medical officers of health, and it definitely gets the answer "No." Patients are far too often moribund on admission to hospital, and sometimes their condition is directly attributable to delay caused by waiting for the result of a swab examination. Such delay is obviously dangerous, for it is generally agreed that the efficacy of antitoxin diminishes rapidly until the fourth day of the illness, after which it is almost valueless. It may be of interest to quote some of the opinions expressed in the reports of medical officers for 1929. The Plymouth report says there is much misconception about the value of swab examinations: it should be realised that a negative report does not exclude diphtheria, and that a positive only serves to confirm the clinical diagnosis. Every year patients are being admitted at a hopelessly advanced stage, and to prevent this it is necessary that the antitoxin should be given first and the swab taken afterwards. From West Ham comes the statement that the present practice of swabbing all suspected throats has not resulted in any improvement in prevalence or fatality; that it is now a firmly established practice to swab and wait for the result of the examination before giving antitoxin; and that results would be better if practitioners relied upon their clinical diagnosis alone. By way of illustration a case is recorded, in which a practitioner, it is said, saw a suspicious throat on a Tuesday, took a swab, received a negative report on Wednesday, and decided it was unnecessary to revisit. On Friday he was sent for and found the whole of the fauces covered with membrane. The child was admitted to hospital and died three days later. The Croydon report mentions that of 21 diphtheria deaths in hospital six occurred within a few hours of admission. It is claimed that the giving of antitoxin as soon as a case is seen at home would reduce the mortality, and it is pointed out that severe and even fatal cases have not very infrequently given negative swab results. The report from Tottenham urges that diphtheria should be treated immediately upon clinical evidence only. The delay in waiting to give antitoxin until the receipt of the bacteriological result often turns the scale against recovery.

Dr. E. H. R. Harries contributes to the Birmingham report some particulars of 69 cases which ended fatally in the City Hospital in 1929. Nine patients died within 24 and six more within 48 hours of admission; 24 were swabbed before admission; but only five had had antitoxin outside the hospitals, and three of these had it after the arrival of the swab report. The patients admitted for diphtheria numbered 2099, of whom 706 presented no clinical evidence and had the diagnosis revised. Of these 706, 368 had been swabbed and the diagnosis was apparently based on a positive report; the remaining 338 had not been swabbed. Among the 368 swabbed, 105 showed nothing abnormal, whilst of the 338 unswabbed, only 39 were free from pathological conditions. Dr. Harries's analysis also shows on what day of the illness the practitioner was called in. In 26 of the 69 cases this was after the fourth day. Thus parental delay is apt to increase the need of promptitude in administration of antitoxin.

TREATMENT OF DIABETIC COMA.

WHEN insulin was discovered it was supposed that any patient could be saved from dying directly from diabetes. But although the mortality from coma has greatly decreased, a certain proportion of cases still end fatally despite treatment which is deemed appropriate. Various workers have lately studied the causes of this failure. Lemann,[1] for instance, points out that alkalis are useless in coma and may even do harm. He thinks that insulin not only eliminates the ketone bodies by oxidation, but also reduces the acidosis by increasing the plasma bicarbonates. According to this view, whether the coma be due to the accumulation of ketone bodies in the blood or to the concomitant acidosis, insulin is the best treatment and he attributes most of his failures to too small a dosage. Lawrence[2] and Coburn,[3] however, find that insulin alone is insufficient, and the latter supports this thesis by the report of cases temporarily recovering from coma in pre-insulin days. While their main line of treatment is similar, these authors differ in their views on the main underlying condition. Lawrence considers that the intense polyuria consequent upon the hyperglycæmia results in the severe dehydration of the patient, as revealed by rapid feeble pulse, low blood pressure, empty veins, low ocular tension, and increased hæmoglobin and blood concentration; and that this is the main factor in the failure of the patient to recover from coma. The remedy he proposes is administration of large amounts of fluid intravenously

[1] Lemann, I. I.: Amer. Jour. Med. Sci., August, 1930, p. 266.
[2] Lawrence, R. D.: Brit. Med. Jour., April 12th, 1930.
[3] Coburn, A. F.: Amer. Jour. Med. Sci., August, 1930, p. 178.

and as soon as possible by mouth. Coburn, on the other hand, views the coma as due to the ketonæmia, the elimination of the ketone bodies in the urine being prevented by a functional renal insufficiency, and he quotes cases in coma with no ketonuria but with a large accumulation of ketone bodies in the blood. Again the treatment consists in the administration of fluid intravenously, which, in Coburn's opinion, acts by stimulating the excretion of ketone bodies in the urine. Whichever view proves correct, the obvious lesson of these observations is that all patients should receive large amounts of fluid intravenously, supplemented as soon as possible by fluid by mouth, and that adequate quantities of insulin and glucose should be given in addition.

A GUIDE TO OFFICIAL STATISTICS.

A GUIDE which covers the whole of the statistical information contained in official publications by Government departments of Great Britain and Northern Ireland is issued annually by H.M. Stationery Office (1s.). The eighth volume to appear has now reached us, and like its predecessors is a book of hardly more than 300 pages which retains its slender bulk by a well-planned system of cross references. An explanatory introduction, when once mastered, enables even one quite unversed in extracting statistical information to find not only which current official publications contain the figures he requires, but also to what mode of analysis they have been subjected. The bulk of the volume is devoted to a subject index which must be consulted with discretion if effective use is to be made of the guide. For example, the Registrar-General provides various statistics concerning each of 205 "causes of death." The inclusion of a direct reference to each is not attempted, for such elaboration would make the guide too bulky; for example, no reference occurs in the subject index to "appendicitis." But the subject "deaths" gives the number (620) of the official publication in which these statistics are recorded and its price. When once the principle has been grasped the professional man will have no difficulty in finding the technical details he requires. Under "Medical Research" the publications of the Medical Research Council and of the Ministry of Health are all indexed under their special titles, though some of them are scientific monographs which give little statistical information. This is a concession which will certainly be appreciated by medical readers, whose needs are moreover met in several other sections.

ACTIVITY OF VITAMIN D.

THE Council on Pharmacy and Chemistry of the American Medical Association have laid down a specification for the estimation of irradiated ergosterol in terms of good quality cod-liver oil by biological tests. In this standard the cod-liver oil may obviously vary greatly; and Holmes and Piggott,[1] in studying the antirachitic value of irradiated ergosterol 100 D (i.e., nominally with 100 times the vitamin D content of cod-liver oil), found that none of the samples had uniform antirachitic activity, and further, that the best sample only had 60 times the activity of the best cod-liver oil tested. The samples of cod-liver oil examined also varied greatly in their vitamin D content. These findings strongly support the action of the Medical Research Council who have recently issued [2] a new standard of vitamin D. They have chosen as their standard a preparation made by exposing pure ergosterol to ultra-violet light under carefully determined and measured conditions which can be repeated at will. The estimation of vitamin D in any material is to be performed by comparing its action with that of the standard in similar experimental animals under the same conditions. By this means the variable factor, the experimental animal and its environment, should be obviated as much as possible. Hess, Poncher, Dale, and Klein[3] have attempted to determine the prophylactic and therapeutic dose of irradiated ergosterol (viosterol) 100 D prepared according to the American specification. They found that in children in the first year of life ten drops a day was the smallest dose that would prevent a fall in the calcium and phosphorus of the blood. No case on a larger dose than this developed any signs of rickets. Ten to 15 drops of viosterol daily produced healing in mild rickets, but more severe cases needed up to 30 drops a day. Although large amounts were administered for six to eight months, no ill-effects were noted beyond constipation and colic. For a time some of the infants received as much as 250 times the prophylactic dose, and the investigation is held to show that there is "a large factor of safety in the administration of larger doses of viosterol at least over limited periods."

[1] Holmes and Piggott: New Eng. Jour. of Med., July 31st.

DIATHERMY IN OTO-LARYNGOLOGY.

THE different forms of diathermy in use by laryngologists are clearly described in a recent monograph by Dr. Dan McKenzie,[4] and since electrical methods are becoming popular in this specialty it is worth while to master the rather confusing nomenclature. In medical diathermy a uniform heating is produced by two electrodes of similar size, while in "surgical" diathermy a large passive electrode is employed and a small active electrode which concentrates the current at the required point and so raises the temperature of the tissues sufficiently to produce coagulation. Two modifications of the surgical method are "fulguration" (the discharge produced when the electrode is brought near to, but not in contact with, the tissues), which destroys the most superficial layers by desiccation, and the "arc-incision," in which the tissues are divided by the electric arc from a sharp fully-charged electrode. Surgical diathermy is the method more generally employed in the treatment of diseases of the throat, and it is with this that Dr. McKenzie is chiefly concerned. For non-malignant affections there is no convincing evidence of its superiority to the older methods with knife or cautery. Dr. McKenzie has performed tonsillectomy by dissection both with the diathermy knife and with the arc. The former is the slower method but is less likely to cause hæmorrhage during the operation, but by neither method is bleeding obviated during the stage of separation of the sloughs. He considers that, for this operation, diathermy presents no particular advantages over the ordinary dissection with ligature of the bleeding points; indeed, the usual dissection method would seem to be preferable, for any considerable late hæmorrhage is an extremely rare sequela to this operation. For patients suffering from the results of

[2] See THE LANCET, August 30th, p. 503.

[3] Hess, J. H., Poncher, H. G., Dale, M. L., and Klein, R. I.: Jour. Amer. Med. Assoc., August 2nd, p. 316.

[4] Diathermy, Medical and Surgical in Oto-Laryngology. By Dan McKenzie, M.D., F.R.C.S.E., Consulting Surgeon, Central London Throat and Ear Hospital. London: Kegan Paul, Trench, Trübner and Co. 1930. Pp. 184. 10s. 6d.

tonsillar sepsis, when tonsillectomy is contra-indicated by the general condition of health, Dr. McKenzie prefers piecemeal diathermy to other methods, such as the galvano-cautery or London paste; he coagulates one or more areas of about 1 cm. in diameter at intervals of once a week or longer, and the duration of treatment is from two to four months. It is acknowledged that there is some soreness, the procedure is a very tedious one, and it is at least difficult to ensure the removal of the whole tonsil and nothing but the tonsil. The only really satisfactory method of treating diseased tonsils still seems to be complete surgical removal, and this operation is rarely contra-indicated by the patient's general condition if careful attention be paid to the method of anæsthesia. It is in the treatment of cancer that diathermy in these regions finds its most useful application, and Dr. McKenzie gives a very valuable description of its application both to "operable" and to ineradicable cancers. In connexion with medical diathermy the enthusiastic French exponent of the method, Dr. Robert Leroux, is quoted freely. The author's most important personal experience deals with the treatment of deafness and tinnitus. Of 47 cases under his care 5 were cured, but 4 of these had only lasted for a few weeks, 5 showed great improvement, 13 improved but tended to relapse, in 2 the tinnitus increased, and in the remaining 22 there was no change. Of 11 cases of less than one year's duration, 3 were cured, 4 improved, and 4 unchanged. On these findings it is recommended that practitioners should advise diathermy for patients suffering from deafness and tinnitus after colds and influenza, and after acute otitis. Conservative family doctors may claim that older methods of treatment give just as good results in these recent affections. In any case there is no doubt that surgical diathermy has proved its value in laryngology, especially in the treatment of malignant disease, and this lucid exposition of the technique and results of its application will be appreciated.

A TRAVELLING CLINIC.

SINCE 1924 the provincial department of health of Ontario has maintained a travelling clinic for the diagnosis of diseases of the lungs. Clinics are organised only with the consent of the county or local medical society or, where no such society exists, of the practising physicians. Only one centre has been visited where this consent was refused. The staff of the clinic consists of from one to three physicians and a nurse. The equipment includes a portable radiological unit and X ray films are taken of every case. Tuberculin intracutaneous tests are done on all children under 16 years of age. No case is admitted to the clinic unless referred by the family physician, and no information is given to the patient at the time of examination. When the clinic returns to Toronto and the radiograms are interpreted and the data are correlated, a typewritten report is sent to the physician who has referred the case. This report includes history, physical findings, X ray interpretation, a diagnosis if possible, and any recommendations that might be helpful. In this way the clinic is intended to work directly with the medical profession in the public service—a service which is supplied by the department without cost to physician or patient. The clinic will deal with any chest case referred to it, including non-tuberculous cases, definite cases of tuberculosis, suspicious cases, and contacts. Especial importance is, however, attached to the examination of the two latter types of cases, especially where children who have been in contact with tuberculosis. Up to the present time 160 sessions have been held in 75 centres, upwards of 8000 cases having been examined. It is the intention of the department to establish some 20 centres in the Province in which clinics will be conducted once or twice a year as may be required.

HUMAN TRYPANOSOMIASIS TREATED WITH TRYPARSAMIDE.

IT is now eight years since the tryparsamide treatment of human trypanosomiasis was instituted in the Belgian Congo, and a critical analysis of available case records has now been made by Dr. Louise Pearce and published as Monograph 23 of The Rockefeller Institute for Medical Research. The total number of cases considered is 1848. Most of them were infected with *Trypanosoma gambiense* and were in an advanced stage of the disease; a small number were infected with *T. rhodesiense*. Dr. Pearce has maintained a judicious and conservative attitude towards the effect of treatment, based, as it should be, on the conception that a drug adapted to general use in African sleeping sickness must have a biological action likely to benefit patients in advanced as well as in early stages of infection. Tryparsamide is the sodium salt of N-phenyl-glycineamine-p-arsonic acid; the compound was developed at the Rockefeller Institute for Medical Research and was synthesised by Jacobs and Heidelberger, its biological action having been studied by Brown and Pearce. Though the arsenic content of the drug is high (25·32 per cent.) the dose that can be administered to laboratory animals by any route is very large; but there is a comparatively narrow margin between the lethal dose and the dose that produces no apparent organic impairment. While therapeutic tests on mice and rats may give a fairly accurate indication of potential trypanocidal action they convey little idea of the actual curative value. The infected rabbit is the animal of choice, since it shows many of the conditions, including involvement of the central nervous system, which are found in man. In this animal tryparsamide has proved highly effective especially in *T. gambiense* and *T. brucei* infections. A drug which will cure a well-developed infection in the rabbit in the same unit dose as will destroy parasites in the circulating blood must have great penetrating power, and it is to this power the therapeutic activity of tryparsamide is ascribed. In experimental animals the trypanocidal action of the drug has been found less potent against *T. rhodesiense* than against *T. gambiense*, and experience with human infections confirms this variation.

The first investigation on the action of tryparsamide in African sleeping sickness was carried out by Dr. Pearce herself in 1920. At its conclusion supplies of the drug were given to physicians in charge of the hospital at Léopoldville as well as to others in the Belgian Congo, and to those in charge of the Pasteur Institute in Brazzaville, in French Equatorial Africa. Further studies were afterwards made in the Cameroons, Angola, Nigeria, the Sudan, Uganda, and Tanganyika Territory. For the most part these reports are concerned primarily with the treatment of native patients in hospital "concentration camps." The greater part of this monograph concerns itself with an analysis of these extensive data, the number of European and American patients treated with tryparsamide being small. The work is carefully annotated and elaborate appendices are included. Its study will show that the drug has now an

established value. The Report of the League of Nations on the Second International Congress on Sleeping Sickness states that all medical officers agree that the former methods of treatment should be replaced by tryparsamide. The examination of the cerebro-spinal fluid and the institutional treatment of all cases presenting modifications of this fluid is advised. The course recommended is one of 12 injections, the maximum dose being 2 g. In the Memorandum submitted by the British Colonial Office to the League of Nations Conference, the Uganda report refers to the prophylactic value of injections of tryparsamide for members of any hunting party. Sterilisation of the blood was found to persist for a considerable period after such injection so that mechanical transmission from one individual to another and also the cyclical infection of the fly should be prevented by this means.

OCCLUSION OF THE CORONARY VESSELS.

IT is now 25 years since A. G. Fryett showed that the coronary arteries could be injected post mortem with a substance opaque to X rays, making it possible to study these vessels and their branches in detail and note the changes in disease. Since then several observers have worked on these lines with variations in technique and apparatus. In the September number of the *Practitioner* appears an important radiographic study of these arteries with special reference to coronary thrombosis by Dr. E. Wyn Jones, from the heart department of the Liverpool Royal Infirmary. It differs from previous work in combining clinical observation of individual cases with subsequent pathological investigation—a method that should be fruitful of results. Dr. Wyn Jones—whose article was adjudged to be the best submitted in a competition open to practitioners of not more than two years' standing—devised his own method of injection, on the lines of the standard technique introduced by Louis Guss in 1921 but simpler and easier of manipulation. His findings agree in the main with those of previous investigators, but he is able to add two new facts to our knowledge: one, that in 5 per cent. of hearts the left coronary artery is the sole supply of the neuromuscular tissue, the other that 11 per cent. of all hearts possess three coronaries, the accessory vessel being found more commonly on the right in the proportion of 8 : 1. Possibly the latter is the accessory vessel demonstrated by J. S. Campbell in 1927 at a meeting of the Association of Physicians of Great Britain and Ireland, and judged by him to be a branch arising from the right coronary artery near its origin; this vessel was present in 20 per cent. of his series.[1] Dr. Wyn Jones notes that the coronary anastomosis becomes much more extensive with increasing age, a fact confirmed by others, and it is of interest to realise that previous coronary disease is an advantage to the patient whose artery is occluded; the gradual diminution of the lumen of the vessel by atherosclerosis allows an efficient compensatory anastomosis to develop, so that when the final block occurs the new anastomotic channels are ready to take on the necessary work. Again a condition of high blood pressure is also an advantage to the patient, for the fall of pressure consequent on the shock of the sudden thrombosis is not so great as it would be in a patient if the pressure were normal, and there is no delay in the opening up of new anastomotic channels. This has been shown to be the case experimentally in animals, where the lower the blood pressure the larger the infarcted area produced.

Each observer who has investigated by these methods has been able to add something to our knowledge of the coronary artery circulation, and how it is affected by disease. More particularly we are learning something of the cause for the varied individual reactions to blockage of the same vessel or the same branch of a vessel. W. Spalteholz, in 1907, by means of his injection and clearing technique, claimed to have demonstrated that no end-arteries existed in the heart, and that there was a rich anastomosis in all its muscular and endothelial layers. Gross established the fact with his radio-opaque bismuth injection technique. "The heart," he said, "is perhaps the richest organ in the body as regards capillary and precapillary anastomoses between branches of the same main vessel and between branches from the two sides." Gross also showed that the accumulation of epicardial fat added to the heart a vascular sheath which slowly thickened with age and made anastomotic communications with the underlying muscle, thereby putting a new complexion on the behaviour of epicardial fat which up till then had often been suspect of causing sudden death where no other cause could be demonstrated. Finally, Geoffrey Hadfield confirmed [2] Gross's statement and was able to show that the anastomoses in the epicardial fat of the senile heart helped it to compensate to a considerable degree for a diminished flow through its atherosclerotic vessels, provided there was no serious drop in blood pressure. Using the celloidin technique of Morison followed by erosion in strong acid, Hadfield confirmed the presence of innumerable anastomoses, which explained recovery following extensive coronary occlusion. In the future it may prove possible to inject some substance opaque to X rays into the veins of the living subject, permitting a detailed examination of the coronary circulation during life.

THE ORAL INJECTION OF LIPIODOL.

FOR introducing lipiodol into the lungs oral injection seems to be the method of choice in America, and is increasingly employed in this country. The ease with which it can be done is often almost incredible. With no previous anæsthetisation, with the patient sitting on a chair and holding out his own tongue, and with apparatus no more elaborate than an ordinary 20 c.cm. syringe and a straight cannula the oil can be steadily dropped over the back of the tongue into the trachea, and the whole affair may be over in three or four minutes. Many patients will declare themselves unaware that anything is happening, but others, of course, are intolerant. Others, again, while appearing to allow the oil to descend the trachea, will hold the oil above the glottis and then expel it all by a sudden cough. In such a case it is an advantage to be able to see exactly where the oil is going, and Arnold Josefson, of Stockholm, has described [3] an instrument for this purpose. It consists of a curved spatula along the upper surface of which is affixed a cannula projecting beyond the end of the spatula; above this is a lamp and a laryngeal mirror. Such a device may be of value in difficult cases, but with gentle persistence it will be found that even the intolerant are often able to allow the oil to flow down the trachea. Lipiodol injections

[1] THE LANCET, 1926, ii., 168.

[2] Brit. Med. Chi. Jour., 1927, xliv., 257.

[3] Acta Med. Scand., 1930, lxxiii.,

are so important in diagnosis, and the oral method is so simple and so infinitely more agreeable for the patient than the crico-thyroid route, and so free of all dangers, that every effort should be made to acquire the technique. Some say it is impracticable and inferior to other methods, but this is not the verdict of more experienced workers. By suitable posture during and after injection, the oil may be made to reach the very apices of the lungs by the oral route, as was well shown in the paper by Dr. W. Burton Wood which we published on June 21st (p. 1339). A full description of the method, which was worked out especially by J. J. Singer, of St. Louis, may be found in a monograph on lipiodol in the diagnosis of thoracic disease reviewed in our columns last year.[4]

HOSPITAL SWEEPSTAKES.

APPARENTLY the promotion of hospital sweepstakes is likely to become a special line of business in the Irish Free State. There is, in the first place, the sweepstake being organised on the Manchester November Handicap by a committee representative of six of the Dublin hospitals. This committee has been registered as "Hospitals' Trust, Ltd." It appears to intend to widen its scope in future, for it is stated that a meeting was recently held, on the invitation of the hospitals concerned in the Trust, of representatives of the boards of several hospitals throughout the Irish Free State, to arrange for a more general participation in future sweepstakes. Representatives from institutions in Cork, Limerick, Waterford, and Louth, as well as from several in Dublin, were present, and tentative agreement was reached to organise a sweepstake on next year's Grand National. Side by side with this enterprise, a new private company was registered last week under the title "The Charities Guild, Ltd." with the object of promoting sweepstakes and drawings of prizes in aid of charitable institutions in the Irish Free State. The managing director is, according to the press, a "well-known turf accountant." The history of the first sweepstake will be watched with much interest by those concerned with hospital finance. Whether sweepstakes are to become one of the principal sources of revenue to Irish hospitals or to sink into disuse will depend on two factors—namely, the amount of money subscribed, and the proportion of it that reaches them.

ŒDEMA DUE TO INANITION.

AT the end of the Great War the prevalence of œdema, called "war œdema" or "famine œdema," attracted considerable attention in Central Europe, as well as in other parts of the world. It was associated with a very poor diet, consisting almost entirely of root vegetables, and various explanations of it were given. Many observers referred it to the high salt content of the diet, but A. Schittenhelm and H. Schlecht,[5] who studied the condition in prison camps, concluded that it was best treated by rest and increased fat and protein in the diet. In 1920 E. A. Kohman,[6] who was investigating the dietary properties of carrots with rats, found that when the diet consisted of little else a certain number of the rats upon it tended to develop œdema. Further investigation seemed to inculpate the protein as the only significant factor. Œdema in a monkey, fed on a diet in which the only proteins were those derived from maize, was described by H. Chick and E. M. Hume[7]; the œdema was rapidly cured by administration of casein. After the war period the urgent practical interest in the problem died down, and it was left in an interesting but inconclusive position for nearly ten years. Last year R. A. Frisch, L. B. Mendel, and J. P. Peters[8] repeated and extended Kohman's work and have established that œdema is produced in rats on a diet in which the protein is entirely derived from carrots. The œdema is accompanied by a marked lowering of the serum proteins, which after two to three months are reduced by 40 per cent. When starch up to 18 per cent. of the total calories is withdrawn from the diet and replaced by casein, the œdema does not develop and the serum proteins are maintained. It is pointed out that E. H. Starling[9] first showed that the colloid osmotic pressure of the serum is proportional to the concentration of protein in it, and he advanced the theory that decreased osmotic pressure in the serum is responsible for the deposition of water in the tissues. Starling's suggestion was subsequently contested but the work just quoted substantiates it, besides affording confirmatory evidence of the dependence of war œdema upon a poor protein supply.

Not long ago Dr. F. J. Poynton and Dr. J. V. Macgregor described[10] in our columns a fatal case of gastro-jejuno-colic fistula in which œdema developed in consequence of deficient absorption, and two less serious cases have lately been reported at the Mayo Clinic by Dr. A. M. Snell.[11] Both Dr. Snell's patients were suffering from pyloric obstruction and had for some time been on inadequate diets, and both had required the administration of large quantities of fluid. The precipitating factor may have been the enforced abstinence from food after operation. Pitting œdema appeared in the legs of the first patient, a woman aged 61, fifteen days after excision of an ulcer and posterior gastro-enterostomy. Marked œdema developed a fortnight after the same operation in the second patient, a plumber aged 44. Investigation of the blood showed that at this time the serum proteins were about 30 per cent. below the normal level—i.e., about 5 g. per 100 c.cm. In both cases there was marked secondary anæmia, which may have interfered with the oxygenation of the tissues and reduced the permeability of the capillaries. The patients were given a diet of high vitamin content with an adequate supply of protein; the first had full doses of ferric citrate and rapidly improved until, at her discharge about six weeks later, the concentration of serum proteins was 7·7 g. in 100 c.cm. and the hæmoglobin and red blood-cell count were practically normal. The second patient had a transfusion of 500 c.cm. of blood, which caused moderate diuresis for two days. After this the œdema was greatly reduced and the serum proteins rose to 5·9 g. in 100 c.cm. Both patients made complete recoveries. These mild grades of inanition œdema must, Dr. Snell thinks, often escape recognition. Provided that the causative disease is not progressive and a high protein diet can be taken, treatment is very effective.

[4] THE LANCET, 1929, i., 670.
[5] Berlin klin. Woch., 1918, lviii., 1138.
[6] Amer. Jour. Physiol., 1920, li., 378.
[7] Biochem. Jour., 1920, xiv., 135.
[8] Jour. Biol. Chem., 1929, lxxxiv., 167.
[9] Jour. Physiol., 1895, xix., 342.
[10] THE LANCET, August 2nd, 1930, p. 240.
[11] Proc. Staff Meetings, Mayo Clinic, July 9th, 1930.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.—At the provincial meeting of this society to be held at Lowestoft on Sept. 19th–20th, the members will be entertained by the Mayor and Corporation of Lowestoft at luncheon on the 20th and not on the 19th as stated in our previous notice.

MODERN TECHNIQUE IN TREATMENT

A Series of Special Articles, contributed by invitation.

CCCVI.

TREATMENT OF CASES OF ABORTION.

PART I.*

BLEEDING from the uterus is almost invariably a precursor of abortion, but there are many pregnancies in which there has been some bleeding that go to term. If bleeding occurs during pregnancy before the child is viable, it must be regarded as a threat of abortion, and it is impossible to say at the onset of the bleeding whether or not the pregnancy can be saved. If the bleeding is free, and there are uterine contractions, there is much greater risk of the pregnancy being destroyed than if there is only slight loss, but in many cases with a very small amount of bleeding the abortion ultimately becomes complete; again in some where the bleeding is extremely severe the pregnancy may continue. All cases of bleeding early in pregnancy must be treated as only threatened abortions until there are definite physical signs that abortion is inevitable, except when the bleeding is so severe as to be a danger to the woman's life. In many cases where abortion is threatened the woman is mentally disturbed and upset at the thought of losing her child, and this state of agitation seems to have an influence in increasing the activity of her uterus and so making an abortion more likely to occur. Any added worry or disturbance caused by anxious relatives or by examination of the patient increases the risk of making a threatened into an inevitable abortion.

In dealing with cases soon after the onset of bleeding, unless the loss is very profuse the patient should be put to bed with as little fuss as possible and given sedatives to reduce her anxiety and to diminish the activity of her uterine muscle. At this stage vaginal examination should be avoided, but if the pregnancy has reached the stage at which the uterus should be palpable a gentle examination of the lower abdomen should be made to make sure that the uterus is of reasonable size for the duration of the pregnancy. If the pregnancy is thought to be in the first two months or so it is wise to inspect the breasts and to make inquiries about symptoms to be sure if possible that the woman is actually pregnant. In the early part of the treatment of threatened abortion the type of sedative needed is one that acts powerfully and quickly, and for this purpose morphia is perhaps the most certain and convenient, but heroin and omnopon are good and may be used in place of morphia. At the onset of the bleeding, after ascertaining the amount of loss and satisfying myself that there is no reason to suspect extra-uterine pregnancy, I give an injection of morphia gr. ¼, and if after a few hours the bleeding shows signs of stopping I give 30 grains of bromide and order a mixture containing 20 grains to be given three times a day. If all loss of fresh blood has ceased after three or four days the bromide can be discontinued, but the patient should be kept in bed at least a week from the time the discharge has ceased to be red. If the bleeding does not stop or obviously diminish in six or eight hours after the morphia has been given, another injection may be tried, and if this fails a vaginal examination must be made as already signs that the abortion is inevitable may be present and further attempts to save the pregnancy are useless.

Inevitable Abortion.

Abortion is inevitable if any part of the ovum can be felt at the external os; when this is possible it means that the cervix has been taken up and the ovum is in process of extrusion. It is often difficult to be quite certain that what is felt at the external os is part of the ovum and not clot, and to satisfy oneself that the cervix is taken up, especially in a multipara with a damaged cervix. When the amniotic sac is presenting and felt there is no great difficulty in recognising it, but clot and a mass of chorion may easily be mistaken for one another, and as too thorough an examination may do harm it is better to wait and assume that what is felt is only clot and to carry on treatment for threatened abortion. If any part of the decidua or the ovum has come away abortion is certain to occur, but is then classified as an incomplete and not as an inevitable abortion. Perhaps the part of the ovum that can be expelled most easily without attracting notice is the amniotic fluid, but if this has escaped there is no hope of the pregnancy continuing.

When the abortion is inevitable or incomplete there is nothing to be gained by delay in its completion and the sooner the uterus is empty the better. In the absence of bleeding reasonable time should be allowed for the uterus to empty itself naturally, and this is especially important if the pregnancy has gone as far as the fourth month, because at or after this time evacuation of the uterus may be extremely difficult and dangerous until the cervix has dilated enough to allow the head to pass through it. Usually the progress of labour in inevitable or incomplete abortions is fairly quick, and within 10 or 12 hours the uterus empties itself; so that all that is needed is to keep the woman in bed under observation in case there should be bad bleeding while the abortion is in progress. Fortunately, the later the pregnancy the more likely is the uterus to expel its contents, so that it is not very common to have to resort to surgical evacuation after about the fourth month. In such cases, if there is delay and the os is only slightly dilated, it is best to deal with the case as with a labour at term and wait for natural delivery, unless interference is necessitated by severe bleeding; when this occurs rupture of the membranes may hasten delivery, or packing the vagina may be needed to stop the hæmorrhage and cause dilatation of the os by stimulating the activity of the uterus.

In abortions occurring in the first three months, if after 10 or 12 hours the uterus is not emptying itself, drugs to stimulate uterine activity should be tried; a drachm of liquid extract of ergot, 1 c.cm. of 10 per cent. pituitary extract, or a drachm of one of the newer preparations of ergot such as ernutin may be given, and half these doses repeated three or four times in the next 24 hours. If after this the ovum is not expelled, the probabilities are that it will be retained for a considerable time, and it is better to evacute the uterus than to wait longer. Until the uterus is empty there is always some risk of free or even dangerous bleeding occurring, so when the likelihood of early natural expulsion has become small this risk should be avoided by completing the abortion. There is also some risk of infection of the retained products, which is reduced by removing them. The early ovum in cases of inevitable or incomplete

* Part II. will appear next week.

abortion is usually very easily removed, as it is often lying in the lower segment of the uterus and detached or only adherent over a small area.

Removal of the Early Ovum.

The patient should be anæsthetised and prepared for a vaginal operation and the vagina swabbed out thoroughly with 1 in 2000 perchloride or biniodide of mercury solution. The cervix is then drawn down and painted with 2 per cent. iodine. Frequently the cervical canal will admit the finger, and if so the presenting ovum should be detached and removed by the finger and ovum forceps. If the finger cannot be passed through the canal the cervix should be dilated with metal dilators until this is possible; after removing the ovum the cavity of the uterus should be explored to make certain that it is empty, and any fragments found should be removed by the finger or the blunt curette and the cavity swabbed out with a strong antiseptic. The antiseptic I am in the habit of using is a spirit solution containing grs. 75 of iodine and grs. 96 of potassium iodide to the ounce. It is important to remember in exploring the cavity for fragments of ovum that the placental site is rough and somewhat raised, and may feel not unlike a retained piece of ovum, and also that the wall of the uterus is soft and may be perforated by too vigorous attempts to remove retained fragments even with the blunt curette. After an abortion, whether terminated naturally or not, the patient should be kept in bed at least one week, and if the pregnancy had reached four months it is better not to allow the patient up in less than ten days.

Retained Products.

After a threatened abortion has been treated with apparent success, it is not quite certain that the pregnancy has been saved, because the ovum may have died at the time of the bleeding and be retained in the uterus for a considerable time without causing further bleeding. A woman who has had bleeding during a pregnancy should be seen a few weeks later to make sure that the uterus is increasing in size and the breasts developing in the ordinary way. If there is any doubt of the ovum being alive it may be necessary to wait another month before a definite diagnosis of retained dead ovum or carneous mole can be made, and then if there is no sign of its being expelled by the uterus, the cervix should be dilated and the retained ovum removed in the same way as in the case of inevitable abortion. If there is bleeding or brown discharge ergot should be given a trial before dilating the cervix.

J. P. HEDLEY, F.R.C.S. Eng.,
Obstetric Physician to St. Thomas's Hospital.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE.

Surg. Comdrs. C. V. Griffiths to *Victory* for R.N. Hospital, Haslar; O. D. Brownfield to *Dorsetshire*; and J. H. Burdett to *Pembroke* for R.N. Hospital, Chatham.

Surg. Lt.-Comdr. A. de B. Joyce to *Victory*, additional for R.N. Hospital, Haslar.

Surg. Lts. J. C. Souter to *Tarantula* and A. M. Lawrence-Smith to *Cicala*.

Surg. Lts. A. L. Moorby and E. R. P. Williams are ransferred to Permanent List.

ROYAL NAVAL RESERVE.

Surg. Lt. A. Elliott to *Vivid*, for R.N. Barracks.

Surg. Sub.-Lts. A. R. Hunt promoted to Surg. Lt., and J. D. Lendrum to *Victory* for R.N. Hospital, Haslar.

ROYAL NAVAL VOLUNTEER RESERVE.

Surg. Lt. A. L. Gunn to *Victory* for R.N. Hospital, Haslar.

Surg. Sub.-Lt. R. J. Davies to *Vivid* for R.N. Barracks.

Proby. Surg. Sub.-Lt. L. A. De Dombal to be Surg. Sub.-Lt.

ROYAL ARMY MEDICAL CORPS.

Lt.-Col. R. J. Franklin retires on ret. pay.

The undermentioned Majs. (temp. Lt.-Cols.) to be Lt.-Cols.: C. Scaife, vice Lt.-Col. R. J. Franklin, to ret. pay; E. B. Lathbury, vice Lt.-Col. R. C. Wilmot, promoted.

The undermentioned Majs. to be temp. Lt.-Cols.: E. D. Caddell and B. Johnson.

Maj. R. I. Sullivan, from the seed. list, is restd. to the estabt.

ARMY DENTAL CORPS.

Lt. G. T. Drummond, temp. Dental Surg., to be Lt. (on prob.).

TERRITORIAL ARMY.

Lt. C. C. Taffs is restd. to the estabt.

TERRITORIAL ARMY RESERVE OF OFFICERS.

R. H. Franklin (late Lt., R.A., T.A.) to be Lt.

ROYAL AIR FORCE.

RESERVE OF AIR FORCE OFFICERS.

Flying Officer F. G. Mogg, of the Special Reserve, is promoted to the rank of Flight-Lt.

INDIAN MEDICAL SERVICE.

Majs. to be Lt.-Cols: J. Scott, F. W. Hay, S. M. Hepworth, H. S. Cormack, K. G. Pandalai, J. L. Sen, C. A. Wood, P. B. Bharucha, and L. H. Khan.

The undermentioned appts. are made: D. J. Young and P. L. O'Neill to be Lts. (on prob.).

The undermentioned officers retire: Lt.-Cols. J. McC. A. Macmillan and T. C. McC. Young.

Lt. V. H. Sarland resigns his commn.

INDIAN MEDICAL DEPARTMENT.

Sen. Asst. Surgs. and Lts. to be Senr. Asst. Surgs. and Capts: A. Bayley-de Castro and R. H. G. Thompson.

First Class Asst. Surgs. to be Senr. Asst Surgs. with rank of Lt.: A. D. Campbell (seed.) and J. G. Johnstone.

Senr. Asst. Surg. and Maj. T. W. Twells retires.

NORTH PERSIAN FORCES MEMORIAL MEDAL.

Captain H. W. Mulligan, M.B., Indian Medical Service, has been awarded the North Persian Forces Memorial Medal for the year 1929 for his paper, Studies on the Reticulo-endothelial System, with Special Reference to Malaria, published in the *Indian Journal of Medical Research* (1929, xvi., 1099). This medal is awarded annually for the best paper on tropical medicine or hygiene published during the preceding 12 months by a medical officer, of under 12 years' service, of the Royal Navy, Royal Army Medical Corps, Royal Air Force, Indian Medical Service, or of the Colonial Medical Service.

A COURSE OF PSYCHOLOGICAL MEDICINE FOR THE PRACTITIONER.—Twenty-four lectures on Psychological Types and Mechanisms will be given at the Tavistock-square Clinic for Functional Nervous Disorders, 51, Tavistock-square, London, W.C. 1, on Wednesdays, beginning Oct. 1st. Dr. E. Graham Howe will lecture from 3 to 4 P.M. every week, the subjects being:—Nerves: Physical and Mental Disorder contrasted; the Neurological and Analytical Viewpoints; Causes of Mental Disorder.—Dynamic Psychology and the Conception of Purpose: Conscious and Unconscious Conflict; Repression: Rationalisation.—The Way the Mind Works: Symbolism, Dreams, and Symptoms.—Emotional Development: (*a*) Racial Factors; (*b*) Individual Factors.—Law: the Rôle of the Father.—Love: the Rôle of the Mother.—Sexual Contrasts: Sadism and Masochism.—Adaptation: Fear; Guilt; Inferiority; Over-compensation.—Wish Fulfilment: Projection.—Resistance and the Unconscious Motive.—A Conception of Mental Disorder: Good and Bad Adjustment. Dr. H. Crichton-Miller will lecture from 4.30 to 5.30 P.M. on Introversion and Extraversion.—Thinking and Feeling Types.—Intuitive and Sensorial Types.—Aggression and Surrender: Sadism and Masochism.—Art and the Creative Type.—Compulsions and the Repetitive Type.—Epilepsy and Psychasthenia.—Neurasthenia and Vagotonia.—Anxiety and Sympathicotonia.—Hysteria and the Ovarian Type.—Dementia Præcox and the Schizoid Type.—Manic Depression and the Cycloid Type. The lectures are open to the medical profession only. Tickets for the course can be obtained in advance from the Hon. Lecture Secretary at the Clinic.

SPECIAL ARTICLES

A DIETARY SURVEY

OF SIX HUNDRED AND SEVEN FAMILIES IN SEVEN CITIES AND TOWNS IN SCOTLAND.*

BY J. B. ORR, *D.S.O.*, *M.C.*, M.D., D.SC. GLASG.,
DIRECTOR OF THE ROWETT RESEARCH INSTITUTE;
AND
M. L. CLARK, L.L.A.
(*From the Rowett Research Institute, Aberdeen.*)

IN the course of the investigation already reported in THE LANCET [1] on the effect of feeding milk to school-children, information on the dietaries of the homes of a number of the children was collected by Dr. K. Rounsfell Brown, Dr. A. F. Turner, Dr. E. M. Henderson, and Dr. H. M. Morrison in the winter and spring of 1926–27. The collected data have since been analysed by Miss Clark who has drawn up and arranged in convenient form the information, including the tables, given in the present report.

Methods of Investigation.

COLLECTION OF INFORMATION.

For the collection of the information, printed forms with sections for each class of common food, with a space for additional foodstuffs, were used. To minimise the risk of items being omitted, the enumeration of the foods in common use was fairly extensive. One of these forms was used for each household. A note was taken of the composition of the family, and a record was made of the food consumed for the period of a week. In some families occasional meals, as for example dinners at schools or soup kitchens, were taken outside the home. Information with regard to the nature of these was obtained and the necessary additions made in calculating the total food consumption of the family. The investigators attempted, by personal observation or by comparing the statements made on consecutive visits, to check the accuracy of the information supplied by the housewife. A thorough and effective check of food consumption was, of course, obviously impossible. It should be noted, therefore, that the basal data consist essentially of statements of the housewife, and not of direct observations of the investigators.

In each case the investigator made a note as to the reliability of the information received. All cases which were regarded as being unreliable were rejected. In addition, some sheets, though regarded by the investigator who collected the information as being reliable, were rejected because internal evidence showed a probability of errors or omissions. In all, 700 sheets were completed. After throwing out unreliable cases there were left 607 which, so far as is known, give a relatively accurate account of the weekly consumption of food in the households concerned.

This method of collecting information on the dietaries of households is obviously much less accurate than the intensive methods used in studies such as those made by Noel Paton and Cathcart, in which the amount of food consumed was determined accurately in a small number of households. On the other hand, the present method, though less accurate for each household, enabled a wider field to be covered by the workers in the time available While there may be some doubt as to the probable error of the quantities of foodstuffs consumed, it is believed that the records of the kind of foodstuffs used in the various households are fairly accurate, and give an indication of the quality of the diet. It was thought that if the caloric intake as calculated from the data was found to be in agreement with that obtained in the more intensive surveys, the information collected might be regarded as sufficiently accurate to warrant drawing tentative conclusions as to the quality of the diets.

WORKING UP DATA.

Plimmer's tables [2] were used for the calculation of the protein, fat, and carbohydrate content and the caloric value of the diets, and Sherman's [3] for the mineral content, except in the case of iron where the data of Peterson and Elvehjem [4] were used. For foods not given by these authors, data were obtained in some cases in the Physiology Department of Glasgow University or in the Rowett Institute. In other cases where no data were available foodstuffs were analysed. The consumption of some articles such as eggs, oranges, bananas, and vegetables was stated in quantities instead of weights. These were assessed on an average weight ascertained by trial at shops.

The percentage of inedible material in vegetables, fruits, meat, and fish according to Plimmer's tables is deducted. No allowance, however, is made for waste or loss in cooking. The figures given in the tables therefore, show the amount of edible material entering the home and not the amount actually consumed. The Food Committee of the Royal Society [5] estimated that 10 per cent. should be allowed for waste. The amount consumed would, therefore, according to this estimate, be on an average 10 per cent. below the amounts stated in the following tables.

As the food requirements of men, women, and children of different ages vary it is obviously necessary in dietary surveys to have a standard of comparison. The standard taken is the food requirements of an average man. The man value standard used in the earlier studies in Great Britain was that of Atwater.[6] Atwater, however, under-estimated the food requirements of both women and children. In Lusk's [7] standard, which was used in later investigations, the requirements of women and children were increased. In the present investigation the Cathcart standard given below is used. The main difference between

Cathcart's Standard of Food Requirements.

Man	..	..	1·00	Child	8–9	..	0·70
Woman	..	..	0·83	,,	6–7	..	0·60
Boy 14	..	..	1·00	,,	3–5	..	0·50
Girl 14	..	..	0·83	,,	2	..	0·40
Child 12–13	..	..	0·90	,,	1	..	0·30
,, 10–11	..	..	0·80	,,	0	..	0·20

the Cathcart and Lusk standards is that the former assesses the requirements of children under 2 years at a lower level and of children of 8 and 9 at a higher level than Lusk.

* Part of the expenses of this Survey was defrayed by a grant made to the Department of Health for Scotland by the Empire Marketing Board. The Nutrition Committee of the Medical Research Council were kept informed of the progress of both this and the previous investigation on the effect of milk on school-children, and acknowledgment is made for the helpful advice and criticisms obtained from the Committee, who are, however, not in any way responsible for the accuracy of the data or views expressed.

In considering the man value of each family in this study, no account was taken of the nature of the occupations of the adults. All adult males are given a value of 1·00, and all adult females one of 0·83.

In most of the surveys made in this country attention has been confined to the energy-yielding constituents of the diets—viz., the proteins, fats, and carbohydrates. It will be convenient, therefore, in comparing the results obtained in this survey with previous work to deal with these first, and then later with the calcium, phosphorus, and iron contents which were also calculated in the present survey.

Results.

A. ENERGY-YIELDING CONSTITUENTS.

Table I. gives the mean value with standard deviation and coefficient of variation for the 607 households.

TABLE I.—*Per Man Value per Day.*

—	Man value.	Calories.	Protein.	Carbohydrates.	Fat.
Mean ..	4·86	3608·9	107·78 g.	574·43 g.	86·11 g.
Standard D.	1·68	755·4	24·68 g.	128·62 g.	24·71 g.
Co-efficient of variation	34·6	20·93	22·90	22·39	28·69

The consumption in the individual households varied widely from the average figures quoted above, as is shown by the size of the standard deviation and coefficient of variation as well as by Table II., which gives the number of households in which the caloric intake and the consumption of protein, carbohydrate, and fat fall within the ranges indicated. The horizontal lines indicate the limits for the generally accepted standard for an adequate diet.

TABLE II.

Calories.		Protein.		Carbohydrates.		Fat.	
Amount	No. of cases.	Amount (g.)	No. of cases.	Amount (g.)	No. of cases.	Amount (g.)	No. of cases.
1500–1750	1	40– 50	1	200–250	1		
1750–2000	1	50– 60	7	250–300	—		
2000–2250	11	60– 70	18	300–350	11	20– 30	1
2250–2500	16	70– 80	46	350–400	35	30– 40	5
2500–2750	46	80– 90	74	400–450	51	40– 50	27
2750–3000	52	90–100	107	450–500	86	50– 60	48
3000–3250	85	100–110	97	500–550	93	60– 70	84
3250–3500	83	110–120	78	550–600	101	70– 80	100
3500–3750	77	120–130	73	600–650	73	80– 90	101
3750–4000	64	130–140	41	650–700	54	90–100	87
4000–4250	52	140–150	27	700–750	39	100–110	53
4250–4500	35	150–160	22	750–800	25	110–120	43
4500–4750	31	160–170	6	800–850	22	120–130	26
4750–5000	23	170–180	8	850–900	9	130–140	18
5000–5250	16	180–190	1	900–950	5	140–150	6
5250–5500	7	190–200	1	950–1000	2	150–160	3
5500–5750	5					160–170	2
5750–6000	2					170–180	2
						180–190	1
	607		607		607		607

Calories.—The average consumption in calories found in representative previous studies in Britain are as follows:—

	Calories.
Noel Paton,[8] Edinburgh, 1900, for 19 families	3233
Medical Research Council Investigation,[9] 1924, 140 miners' families, Scotland and England	3005
Hill, Essex,[10] 1925, 90 families	2872
Medical Research Council,[11] 1926, 79 families	2686

In the United States, Sherman and Gillett,[12] in a study of 92 families, found 11 below 2000 calories, and 22 above 3500. McKay, Ohio,[13] in 47 families found an average of 3587 calories. In a study in Tennessee[14] with 64 families, the average for the town was 3650 and for the country 3731. In Georgia,[15] in a study of 14 families, the average was 4243. In other countries Mason[16] estimates the pre-war food consumption in Germany as 4780, and Komu and Sokamoto[17] give records of two Japanese labourers with diets averaging 3768.

In all the previous studies which included a considerable number of families there was found, as in the present investigation, to be a wide variation in the caloric consumption. For example, in Noel Paton's study of 19 families the range was from 1834–4796. In McKay's of 47 families the range was from 2081–5828. In the Medical Research Council investigations of 79 families the range was from 1396 to 3916 calories.

It is difficult to compare the results of the present survey with former ones owing to the different standards of man value used. In Noel Paton's Edinburgh studies Atwater's standard was used, and in the later ones Lusk's. The difference between the man values of the average family on the two standards has been found to be about 14 per cent. Cathcart's standard used in the present survey would be higher or lower than Lusk's according to the ages of children in the family. The other complicating factor already referred to is that the present investigation merely gives the amount of food used in the house without making any allowances for wastage whereas in the other studies made in this country the amount actually consumed was determined. As already indicated the wastage not deducted in the present investigation is probably about 10 per cent. Taking account of these factors it would appear that the average found in the present investigation is slightly higher than that of previous investigations in this country, but is lower than three out of the four United States studies, and lower than Mason's estimations for pre-war Germany, or Komu and Sokamoto's records for Japanese labourers.

Calorie Requirements.—The standards for an adequate diet as set by various authorities vary from 3000 to 3500. Table II. shows that out of the 607 families, 127 fall below 3000, and 312 are above 3500. On the arbitrary assumption that 2500 is the lower limit for a sufficient diet, 29 houses out of the 607 were receiving too little food. On the other hand, in 171 houses the amount of edible food entering the home was over 4000 calories per man—an amount which indicates either an unnecessarily high consumption or excessive waste.

Table III. shows the proportion of the total number of calories supplied by protein, fat, and carbohydrates respectively in the seven towns.

TABLE III.—*Per Man per Day.*

No. of families	Town.	Protein.		Carbohydrates.		Fat.	
		g.	%	g.	%	g.	%
106	Edinburgh	100·3	12·4	516·3	63·4	84·4	23·5
57	Glasgow	108·9	12·1	575·2	63·9	95·5	24·0
37	Dundee	97·9	11·9	538·0	65·4	82·2	22·7
143	Aberdeen	107·9	12·5	561·0	65·1	84·8	22·3
103	Peterhead	126·1	12·5	685·7	68·2	85·2	19·2
31	Paisley	107·2	12·9	577·9	65·2	88·4	22·6
130	Greenock	101·7	11·9	557·7	64·8	86·9	23·0

There is a remarkable degree of uniformity between the different towns. In Peterhead the percentage of carbohydrates is higher and that of fat lower than in any of the other towns. This is due to the fact that the consumption of syrup and treacle appears to be greater, and that of butter and margarine less in this

town than in the others. The average percentage for the total households of all the towns as calculated from Table I. is: protein 12·3, carbohydrates 65·5, fat 22·2. This approximates very closely to the standard proposed by the U.S. Division of Food and Nutrition as the standard proportion for army diets: protein 12·5, carbohydrates 62·5, fat 25·0.

Protein.—The percentage of protein found in the present investigation is higher than that of most of the previous British studies. In the four already quoted, Edinburgh [8] gave 13·6, Miners [9] 10·0, Essex Rural [10] 10·7, and Scottish Urban and Rural [11] 11·3.

In the present study 41·7 per cent. fall below 100 g., but only 8, or 1·3 per cent., out of the 607 families receive less than 60 g.

Fat.—The fat percentage (22·2) of the present study is lower than that of any of the four British studies: Edinburgh 25·3, Miners 29·9, Essex Rural 22·9, Scottish Urban and Rural 26·4. The Inter-Allied Scientific Food Commission regarded 75 g. of fat daily (20–25 per cent. of the total energy value of the diet) as necessary, Voit [18] and Rubner [19] 55–60 g. In the present study only 6 families have a consumption of less than 40 g. daily, and only 13·3 per cent. fall below 60 g.

The foregoing consideration of the data on the energy-yielding constituents shows that there is no general shortage of any of these in the diets of the households studied. Of 607 families in only two cases is the intake below 2000 calories. Only eight received less than 60 g. protein, and only six less than 40 g. fat per man value. There is thus no evidence of any widespread under-nutrition.

B. NON-ENERGY YIELDING CONSTITUENTS—CALCIUM, PHOSPHORUS, AND IRON.

The mean standard deviation and coefficient of variation for calcium, phosphorus, and iron are shown for the seven towns singly in Table IVA., and combined in Table IVB.

TABLE IVA.—*Food Constituents and Standard Deviation in Grammes.*

City ..	Aberdeen.	Dundee.	Edinburgh.	Glasgow.	Greenock.	Paisley.	Peterhead.
Families ..	143	37	106	57	130	31	103
M.M.V. ..	4·89	5·46	5·45	4·69	4·71	4·85	4·48
Mean Ca* ..	0·97	0·70	0·65	0·89	0·72	0·67	1·19
S.D.* ..	0·31	0·21	0·21	0·35	0·25	0·22	0·34
C. of V. ..	31·69	29·31	32·91	40·77	34·83	32·82	28·87
Mean P.* ..	1·75	1·44	1·46	1·72	1·57	1·57	2·14
S.D.* ..	0·34	0·26	0·36	0·54	0·40	0·40	0·48
C. of V. ..	19·28	18·35	24·89	31·55	25·63	25·55	22·44
Mean Fe* ..	0·015	0·011	0·012	0·014	0·012	0·011	0·020
S.D.* ..	0·008	0·002	0·003	0·005	0·004	0·004	0·005
C. of V. ..	51·35	19·76	26·94	38·25	30·42	33·22	24·65

* = Grammes. M.M.V. = Mean man value.

TABLE IVB.—*Per Man Value.*

	Ca.	P.	Fe.
Mean	0·86 g.	1·70 g.	0·0143 g.
S.D.	0·34 g.	0·46 g.	0·005 g.
C. of V. ..	39·94	27·39	34·46

The mineral content has not been estimated in dietary studies previously undertaken in Britain, but figures are reported from studies in other countries.

Calcium.—Sherman, Mettler, and Sinclair,[20] in an American dietary study calculated the average calcium consumption to be 0·57 g. per day for a man, 0·59 g. for a woman. Tigerstedt,[21] in Finnish diets, found that the daily calcium intake ranged from 1·58 g. for children 2–3 years old up to 3·79 g. for men. Horneman,[22] in 1913, estimating food actually consumed in German households, found the calcium intake to be for a man 1·227 g., for a woman 0·615 g., and for a 6 year old child 0·427 g. Sherman and Gillett (loc. cit.) in the 92 American dietaries, showed the average calcium consumption to be 0·72 g.

In the present study the mean of the combined Scottish towns is 0·86 g. The high calcium intake appears to be due to a more liberal supply of milk and treacle, both of which are rich in this element.

From all the evidence available Sherman,[3] in 1927, calculated the minimum maintenance requirement in calcium to be 0·45 g. daily, and considers 0·68 g. necessary to allow a margin for safety. From Table V., which gives the range of intake, it will be seen that 47 families, or 7·7 per cent., fall below 0·45, and 149, or 24·5 per cent., fall below 0·60 g. which is slightly below Sherman's safety limit and roughly about 20 per cent. fall between 0·60 and 0·75 g.

Phosphorus.—The average phosphorus consumption in Sherman, Mettler, and Sinclair's (loc. cit.) study was 1·40 g. per man, and 1·21 g. per woman. Tigerstedt's (loc. cit.) Finnish diets showed an intake ranging from 1·18 g. for 2–3 years old children up to 4·33 g. for men. Sherman and Gillett's (loc. cit.) 1917 study gave an average intake of 1·52 g. The present study shows a mean of 1·70 g. in the combined towns, which individually range from 1·44 g. (Dundee) up to 2·14 g. (Peterhead, which has the highest mean calorie and protein intake). Sherman indicates the minimum requirement in phosphorus to be 0·88 g. daily which with the 50 per cent. safety margin becomes 1·32 g. In this Scottish study 14, or 2·3 per cent., fall below 0·90 g. and 140, or 23 per cent., below 1·35 g.

Iron.—There is very little definite information in the literature on the requirements of men for iron or on the amounts actually consumed. Horneman (loc. cit.) found consumption to be 54·67 mg. for a man, 31·82 mg. for a woman, 18·76 mg. for a 6 year old child. Sherman and Gillett (loc. cit.) found the intake to range from an average of 12·1 mg. in the cheaper diets to one of 20·6 mg. in the more expensive, giving an average for the 92 households of 16·3 mg. In the present study the average of the combined Scottish towns is 14·3 mg., ranging from 11·3 mg. in Dundee to 20·2 mg. in Peterhead.

Sherman from his own and other experimental data on iron elimination, concludes that 15 mg. daily is required. If we accept this figure as the standard, 61·6 per cent. of the 607 families must be regarded as receiving an insufficient amount of iron in the diet.

Table V. gives the number of households in which the consumption of calcium, phosphorus, and iron falls within the ranges indicated.

The horizontal lines are placed to give an indication of the optimum intake in so far as can be determined from the limited information available. It is seen that there is a large proportion of the households in which there is a definite shortage of one or more of these three nutrients. In the present state of our knowledge, however, it would be unsafe to draw any definite conclusions from these figures. It is to be regretted that we have not more information with regard both to the requirements and the consumption of these nutrients. This is obviously an aspect of

human nutrition on which more work is urgently needed.

TABLE V.

Ca.		P.		Fe.	
Amount (g.).	Cases.	Amount (g.).	Cases.	Amount (g.).	Cases
				0·0030–0·0045	2
				0·0045–0·0060	10
				0·0060–0·0075	15
		0·600–0·750	4	0·0075–0·0090	53
		0·750–0·900	10	0·0090–0·0105	65
0·150–0·300	5	0·900–1·050	17	0·0105–0·0120	60
0·300–0·450	42	1·050–1·200	51	0·0120–0·0135	87
0·450–0·600	102	1·200–1·350	58	0·0135–0·1050	82
0·600–0·750	120	1·350–1·500	87	0·0150–0·0165	59
0·750–0·900	104	1·500–1·650	71	0·0165–0·0180	52
0·900–1·050	76	1·650–1·800	86	0·0180–0·0195	42
1·050–1·200	58	1·800–1·950	59	0·0195–0·0210	20
1·200–1·350	45	1·950–2·100	57	0·0210–0·0225	24
1·350–1·500	22	2·100–2·250	35	0·0225–0·0240	15
1·500–1·650	20	2·250–2·400	27	0·0240–0·0255	3
1·650–1·800	5	2·400–2·550	21	0·0255–0·0270	5
1·800–1·950	3	2·550–2·700	8	0·0270–0·0285	5
1·950–2·100	2	2·700–2·850	5	0·0285–0·0300	3
2·100–2·250	2	2·850–3·000	2	0·0300–0·0315	2
2·250–2·400	1	3·000–3·150	4	0·0315–0·0330	2
		3·150–3·300	—	0·0330–0·0345	1
		3·300–3·450	4		
		3·450–3·600	1		
	607		607		607

Diets in Relation to Growth.

The standards referred to above have been fixed as the requirements of adults whose needs are only those of maintenance—i.e., the amounts of the different dietary constituents for replacement of the loss in "tear and wear" of the tissues. In addition to this maintenance requirement, children need material for the construction of new tissues in growth. Unfortunately, less work has been done on the growth requirement of children than upon the maintenance requirements of adults, though from the point of view of health the former is probably the more important. We are indebted for whatever information we have chiefly to Sherman and his co-workers.

Sherman and Hawley, as the result of balance experiments with children, estimated that children from 3 to 13 years of age need 1 g. of calcium and from 1·16 to 1·46 g. of phosphorus per day. Sherman also considers that the need of the child for iron is greater proportionately than that of the adult. In accordance with these findings, Hawley [23] has drawn up the following scale of man values for protein and mineral requirements.

Hawley's Scale for Protein and Mineral Requirements.

Man	18 to 60	1·0	Girl	13 to 14	1·3
Woman	,,	0·8	,,	10 to 12	1·2
Youth	15 to 17	1·5	Child	6 to 9	1·0
Girl	,,	1·2	,,	under 6	0·8
Boy	10 to 14	1·3			

To ascertain the average consumption on this growth requirement scale the man value for Dundee was recalculated on the Hawley standard. On this standard the mean man value was 7·19 as compared with 5·46 on Cathcart's standard. The average protein and mineral consumption in Dundee on the two scales is given below.

Comparing Cathcart's scale on which the man value is calculated on an energy requirement basis with that of Hawley on which it is calculated on the requirements of growth, it is seen that on the latter basis the diet provides roughly nearly 25 per cent. less of protein, calcium, phosphorus, and iron per man unit.

—	Cathcart's scale, based on energy requirements.	Hawley's scale, based on requirements for growth.
Protein (g.)	97·90	74·77
Calcium (g.)	0·70	0·53
Phosphorus (g.)	1·44	1·101
Iron (g.)	0·0113	0·0087

We have seen that calculating the intake according to Cathcart's scale the number of families which fall below the standards for these substances was 41·7, 24·5, 23·0, and 61·6 per cent. respectively. On the Hawley scale these numbers would, of course, be greatly increased. This is brought out in Table VI., in which the diets are calculated on the basis of this scale.

TABLE VI.—*Range on Hawley Scale (Dundee).*

Protein.		Calcium.		Phosphorus.		Iron.	
Amount (g.).	Cases.	Amount (g.).	Cases.	Amount (g.).	Cases.	Amount (g.).	Cases.
						0·0030–0·0045	1
						0·0045–0·0060	1
						0·0060–0·0075	8
40– 50	1					0·0075–0·0090	14
50– 60	2			0·600–0·750	1	0·0090–0·0105	9
60– 70	13			0·750–0·900	4	0·0105–0·0120	2
70– 80	8	0·150–0·300	1	0·900–1·050	10	0·0120–0·0135	1
80– 90	8	0·300–0·450	7	1·050–1·200	11	0·0135–0·0150	1
90–100	4	0·450–0·600	20	1·200–1·350	9		
100–110	1	0·600–0·750	7	1·350–1·500		0·0150–0·0165	
110–120		0·750–0·900	1	1·500–1·650	1	0·0165–0·0180	
		0·900–1·050	1	1·650–1·800	1		
	37		37		37		37

From the table it is seen that out of 37 families only one had over 100 g. of protein; nine over 0·6 g. of calcium; two over 1·35 g. of phosphorus, and none over 0·015 g. of iron, the standard requirements according to Sherman. On the whole the average intake of these substances is lower in Dundee than the average for the whole seven towns. This city has the lowest average for phosphorus, lowest average for iron, and third lowest for calcium. The percentage of families receiving less than the standard requirements would not be so high in the other towns. Even allowing for this however, a superficial examination of Table V. in the light of Table VI. shows that probably the majority of families in all the towns are on diets with less than the optimum amounts of protein and these three minerals.

The only other dietary survey carried out under comparable conditions and calculated to this scale is that of McKay (loc. cit.) for 47 families in Ohio. The average consumption as found by McKay is compared with the average consumption in the present survey in the following figures:—

—	Ohio.	Scottish Towns.
	Average.	
Calories	3587	3609
Protein	92·9 g.	74·77 g.
Calcium	1·087 g.	0·532 g.
Phosphorus	1·594 g.	1·101 g.
Iron	0·0163 g.	0·0087 g.

The difference between the composition of the diet in Ohio and in these Scottish diets is striking. The former is wholly adequate for growth with regard to

the constituents named. Compared with the average Ohio diet the Scottish diet, while rich enough in energy-yielding constituents, contained only from one-half to two-thirds as much of these nutrients required as constructive material in growth.

Discussion of Results.

In the milk tests on school-children, in connexion with which the present survey was made, more than one-third of the children came from the households studied in the present survey, and these households were chosen as representative of the homes of all the children. It is of interest, therefore, to consider the results of the milk tests in the light of the results of the survey. In the tests it was found that the giving of extra milk was followed by increased rate of growth, as determined by both increased height and increased weight. The increase was from 20–40 per cent. in each of three groups of different ages in the whole of the seven cities and towns. Separated and whole milk were found to be of practically the same value for growth for school-children. On the other hand, the addition of carbohydrate and fat-rich biscuits had no effect on growth. The finding that the additional fat and carbohydrate given in the biscuits had no definite effect, combined with the finding that the whole milk, including the fat, had little or no greater effect than the separated milk without the fat, could only be explained on the grounds that the caloric intake of the children was on the whole sufficient for their needs. This is in agreement with the results obtained in the dietary survey.

Factors common to both separated milk and whole milk are proteins and minerals. The survey shows that a large proportion of the diets had less than the amounts of protein, calcium, phosphorus, and iron necessary to maintain optimum growth. It seems probable, therefore, that at least some of the effects of the separated milk can be attributed to the protein and minerals.

The results of the survey seem to indicate that there is a shortage of calcium, phosphorus, and iron in many of the urban diets. Our information with regard to the requirements of these is, however, very inadequate. Further, there are very little data with which those of the present survey can be compared. It would be unsafe, therefore, to draw any far-reaching conclusion from the results of the present survey. They are, however, of sufficient interest to warrant the suggestion that more information is urgently needed both on the requirements for those nutrients and on the intake.

No attempt was made to assess the vitamin value of the diets. The omission is due, not to lack of appreciation of their importance, but to the fact that in the present state of our knowledge neither the vitamin content of the foodstuffs nor the vitamin requirements of individuals at different ages can be expressed in units suitable for statistical treatment. It is more than probable, however, that there may be a deficiency of some of the vitamins especially, in view of the results obtained with milk, of those concerned with calcium assimilation and with growth.

If the tentative conclusions of the survey can be regarded as even approximately accurate, it is evident that the dietaries of these urban households would be greatly improved by an increased consumption of milk and green vegetables. Milk is the best and cheapest source of protein and calcium. It is also rich in phosphorus. Green vegetables are rich in both calcium and iron. In addition to these nutrients milk and vegetables would also enrich the diet in those vitamins liable to be lacking in a carbohydrate-rich diet.

Summary.

The main points brought out by the statistical analysis of the diet are as follows:

(1) In 607 families in seven Scottish towns the average diet, taken as the amount of edible material entering the house and calculated on Cathcart's standard of man values, was found to have a caloric value of 3609, with 107·8 g. protein, 574·4 g. carbohydrate, and 86·1 g. fat per man value.

(2) The mineral content of the diets was also estimated using the same man value scale. This showed an average amount per man of 0·86 g. calcium, 1·70 g. phosphorus, and 0·0143 g. iron.

(3) Of the 607 families the following percentages were found to be below the generally accepted standards of requirement for adults for the food constituents dealt with; protein, 41·7 per cent.; fat, 13·3 per cent.; calcium, 24·5 per cent.; phosphorus, 23·0 per cent.; and iron, 61·6 per cent.

(4) The diets for one town (Dundee) were recalculated on the Hawley higher man value scale, which takes into account the requirements in protein and minerals for growth in children. The average amount per man value on this scale was found to be: protein, 74·77 g.; calcium, 0·53 g.; phosphorus, 1·101 g.; and iron, 0·0087 g.

(5) In this town the standards of intake necessary for optimum growth were reached in the case of the 37 families studied in only one case for protein, nine cases for calcium, two cases for phosphorus, and none for iron.

(6) The results of the survey indicate that the diets are, on the whole, adequate as regards their energy value. Comparatively few fall below the minimum necessary for health. Only 29 out of the 607 families are below 2500 calories, which is sufficient for a man not doing manual labour. Only two families fall below 2000 calories. There is thus no indication of any extensive gross under-nutrition.

(7) When the diets are considered from the point of view of their adequacy to support optimum growth the results are less satisfactory. The diets are poor in protein and poorer still in the minerals estimated. According to Sherman's standard of requirements the great majority of the diets are incapable of supporting the optimum rate of growth.

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TUBERCULOSIS SCHOLARSHIP TOUR.

(FROM OUR OWN CORRESPONDENT.)

Two years ago a party of Canadian medical men and women visited this country to make a study of tuberculosis work, and a return visit was paid last month by a group of 50 British medical men and women. The itinerary was planned by Dr. W. E. Wodehouse, secretary of the Canadian Tuberculosis Association, and both tours were made possible by the offer of scholarships from the Sun Life Assurance Company of Canada.

QUEBEC AND MONTREAL.

The s.s. *Duchess of Bedford* was due to arrive at Quebec early on the morning of Friday, August 15th, but was delayed by fog until the evening, and the programme for the day had to be cut out, save for a very late dinner at the Château Frontenac, given by the Provincial Government. Montreal was reached next day, and on Sunday the real business of the tour began with an inspection of the Sacred Heart Hospital, Cartierville. This is a magnificent building planned, organised, and owned by a Roman Catholic sisterhood, but with an independent medical staff attached to the Montreal General Hospital. The afternoon programme included a visit to the country estate of Mr. T. B. Macaulay (President of the Sun Life Assurance Company) and an inspection of his wonderful herd of Frisian cattle which have had a negative tuberculin test for seven years. The bacterial count of the milk is now almost nil.

OTTAWA.

At Ottawa next day an inspection of Parliament Buildings was followed by a visit to the Research Laboratories of the Health of Animals Branch, Federal Department of Agriculture. Here four short lectures were given. Dr. A. E. Cameron outlined the methods adopted for the control and eradication of bovine tuberculosis in Canada; Drs. Hoefflin and Stanley gave a study of the blood picture in bovine tuberculosis; Drs. McIntosh, Watson, and Konst gave a comparative study of vaccination with living tubercle bacilli, with especial reference to B C G; and Dr. C. A. Mitchell a comparative study of the biology and pathogenicity of tubercle bacilli of avian, bovine, and human origin. The next visit was to the Royal Ottawa Sanatorium, a well-equipped and up-to-date institution, the cost of which is borne by the city, aided by a grant from the province of Ontario. A brief visit to the Civic Hospital, which has a few beds for tuberculous patients, a tour of the city, and dinner at the Château Laurier as guests of the City of Ottawa, completed the second day.

TORONTO.

Toronto was reached on Tuesday morning when a pathological demonstration was staged at the Hospital for Sick Children by Dr. H. C. Parsons, physician in chief, and Dr. Erb, pathologist to the hospital. Dr. Erb showed a number of post-mortem specimens from children dying from tuberculous meningitis and miliary tuberculosis. The specimens showed a small primary focus in the lung with corresponding lesions in glands draining that portion of the lung. A second group of cases illustrated the point that as the disease progresses and the mediastinal glands enlarge, the mediastinum takes on the appearance of a large tumour. The third group illustrated certain types of accident that may occur in persons with mediastinal tuberculosis—e.g., caseous glands breaking down into a bronchus, with resulting fatal aspiration, pneumonia, thrombus in the right pulmonary artery, &c. Dr. Parsons said that the Chest Clinic was started with a view to ascertaining how much tuberculosis was communicated to children by adults. They also wished to find out the way in which early tuberculosis started. They had become convinced that the main feature was mediastinal in the early stages rather than pulmonary. Practically all the tuberculosis in Toronto was of human type. The material in the hospital was definitely selected, the chest clinic automatically getting all the contacts immediately, also all children from school clinics suspected of tuberculosis. Children with positive tuberculin tests and no clinical or physical signs are believed to be invariably suffering from tracheobronchial tuberculosis. Prof. Schick in a recent visit to the hospital concurred in this view.

A visit to the diagnostic clinic at the Gage Institute, of which Dr. W. J. Dobbie is the physician in chief, was the next item. At this clinic 65,550 persons have been examined, the average number at present being 500 per month. Nearly all these patients are sent by physicians in Toronto and from within a radius of 50 miles of the city. No treatment whatever is given at the clinic. Dr. Dobbie is also physician in chief of the Toronto Hospital for Consumption which has a daily average number of 350 patients in residence. This was the first hospital for advanced cases of tuberculosis established anywhere in the world. Another institute visited was the Christie Street Hospital, containing about 350 beds, which is maintained by the Federal Department of Pensions and National Health for ex-Service men. A visit to the Connaught Laboratories and School of Hygiene in connexion with the University of Toronto was arranged for the remainder of the afternoon. In these laboratories research is carried out in various fields of preventive medicine, and biological products—diphtheria and tetanus antitoxins, liver extract, insulin, &c.—are prepared. The day finished with a dinner given by the Provincial Government of Ontario to the members of the tuberculosis party.

On Wednesday a demonstration was given by Dr. G. C. Brink, of the Travelling Clinic, for the diagnosis of diseases of the lungs, of which the Government bear the whole cost. The staff of the clinic consists of from one to three physicians and a nurse. The equipment includes a portable X ray unit, and X ray films are taken of every case. Tuberculin tests are done on all children under 16 years of age.

A short inspection of Hart House, the well-equipped non-residential quarters of the University Students' Union, was followed by a visit to the Children's Preventorium. This was opened in 1910 with 100 beds for tuberculin-reacting contacts of sputum positive cases in the city. No definite cases of pulmonary tuberculosis and no surgical cases are admitted. The duration of stay is up to nine months, but may be indefinitely prolonged where the home conditions are bad.

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BALA.

A night journey to Bala enabled the party to board the steamship *Cherokee* in time for breakfast. Two or three hours were spent on Lake Muskoka, winding in and out of the hundreds of thickly wooded islands, till Calydor Sanatorium was reached. This very beautiful hospital, of which Dr. Parfitt is physician in chief, was established 14 years ago for private patients. Two types of patient are received here: those who come for diagnosis and only make a short stay, and those who are very ill and stay on for indefinite periods to get well. When the tour of the sanatorium was completed the members of the Beaumaris Yacht Club kindly took the whole party for a delightful trip on the lake in a number of motor boats, and afterwards entertained their guests at lunch. A move was then made to the Muskoka Cottage Sanatorium for private patients, the first sanatorium in Canada, opened in 1896. Both this institution and the Muskoka Hospital for Consumptives are under the care of Dr. W. B. Kendall, and both were intended at first only for incipient or early cases of tuberculosis. At present, however, moderately advanced and advanced cases form an overwhelming majority of the patients. Both these institutions appear to be ideal for their purpose in regard to climate, situation, amenities, design, equipment, and medical care available.

After dinner at the Muskoka Hospital the steamer was boarded for the return trip across Muskoka Lake, the party entraining late that night at Bala for the long railway journey to Ninette, Manitoba, where the week-end is to be spent as the guests of the Manitoba Sanatorium Board. On Monday afternoon the party will entrain for Winnipeg, where the British Medical Association meeting is to be held. At the end of the meeting the party will leave for Chicago and other cities in the United States. The tour ends officially on Sept. 5th, but many individual members are planning to extend it.

UNITED STATES OF AMERICA.

(FROM AN OCCASIONAL CORRESPONDENT.)

MEDICAL ADVERTISING BY GROUPS.

THE success of public health advertising by county medical societies in New York, Ohio, and elsewhere is resulting in a new crop of experimental advertising campaigns. The movement has reached the State of Washington on the west coast, and 80 members of the Pierce County Medical Society have subscribed $4500 for use in their locality. An advertising agency in Seattle is acting as consultant, but all published articles are passed upon by a committee of the society. The advertising "messages" appear in the first place in the three county newspapers, then each is reprinted in leaflet form for distribution by the doctors to their patients. Finally they are bound together with a roster of the county medical society, and presented to the public libraries and schools.

"The articles," it is stated, "will make known essential facts in the progress of medical science, the real work and aims of the organised medical profession, and its every-day relation to all classes of people. The qualifications demanded of the competent physician to-day, and the standards by which he is identified may be indicated. It is believed that this work will result in a broader knowledge of public health and assist materially in the prevention of disease; and it is for these reasons that the educational campaign has been undertaken."

IMMUNOLOGY OF SCARLET FEVER.

The use of scarlet fever streptococcal toxin and the corresponding antitoxin for the prevention and treatment respectively of scarlet fever was discussed at the annual conference of State and territorial health officers with the U.S. Public Health Service. The conference was reminded by Dr. M. V. Veldee that four years ago they had come to the following conclusions: (1) The intradermal reaction to scarlet fever streptococcus toxin is a fairly dependable measure of the susceptibility of the individual tested. (2) The majority of the individuals giving a positive reaction can be effectively immunised by the proper use of scarlet fever streptococcus toxin. (3) The use of scarlet fever streptococcus antitoxin, either for passive immunisation or for the treatment of the individual ill with scarlet fever, is not yet founded on sufficient clinical data to permit a mature opinion as to the efficacy of this form of treatment. The large amount of research since that time had given little reason, he believed, to alter these conclusions. Probably 90 to 100 per cent. of persons giving a Dick-positive reaction can be converted to Dick-negative reactors by the injection of scarlet fever streptococcus toxin. The effect that such prophylaxis may have on the incidence of scarlet fever in a large community cannot at present be stated, though encouraging statistics are reported in the *Journal of Infectious Diseases* by Toyoda [1] and his co-workers in Manchuria. There are also certain practical difficulties of administration which retard the adoption of this method of prophylaxis. Dr. Veldee referred especially to the uncertainty existing as to the number of injections to be given, and the disadvantages of giving many injections of a solution relatively high in protein content. He felt that we need a product which will be satisfactory with fewer doses, and will give rise to less reaction.

TOXIN-ANTITOXIN AND TOXOID.

At the same conference Dr. W. T. Harrison reported a study made at the National Institute of Health (formerly the Hygienic Laboratory) on the comparative merits of toxin-antitoxin and toxoid. Tests were made on comparable groups of children under strictly controlled conditions. Schick tests were given before and at a stated interval after immunisation. The test in children who received toxin-antitoxin was controlled with heated toxin, that in the children who received toxoid by toxoid diluted in 1 in 20 physiological saline solution. Various commercial samples were used, and one sample of toxin-antitoxin prepared in the laboratory of the institute. Diphtheria toxoid was found to be "practically an ideal agent" both on account of the complete absence of local or general reactions, and the very high percentage of successful immunisations following two injections. The injections, of 1·0 c.cm. each, were given at an interval of one month. In 475 children immunity, as measured by the Schick test, was conferred in 95 per cent. of cases. In the group receiving toxin-antitoxin, only 64 per cent. were successfully immunised.

APPENDICITIS.

In its July bulletin, the Metropolitan Life Insurance Company draws attention to the large and increasing number of deaths from appendicitis. More than 18,000 deaths were recorded from this cause in the United States in 1928. The increase is believed to be

a real one, and not due in any large degree to greater precision in the filling out of death certificates. In general health examinations in recent years, between 2 and 3 per cent. of males have shown tenderness in the appendix region. It is suggested that critical research is needed to uncover the causes leading up to inflammation of the appendix.

"JAKE" PARALYSIS.

A preliminary communication from the National Health Institute [2] announces that the mystery of "Jake" paralysis is solved. The poison is a phosphoric acid ester of one of the cresols. An adulterated ginger made up from the U.S. Pharmacopœia fluid extract but containing 2·7 per cent. of tricresyl phosphate (technical) gives all the effects in rabbits and monkeys that samples of suspected Jamaica ginger had given. The rabbits were poisoned, the monkeys escaped. The isolation of this phenol compound was greatly assisted by the bureau of prohibition who were able to supply large quantities of seized Jamaica ginger, some of which was known to belong to batches which had caused poisoning. It is interesting that the ester is apparently not broken down by dogs or monkeys, and large doses can be taken by them without injury. Rabbits suffer from phenol poisoning. Calves also suffer with a type of paralysis more closely simulating that found in man.

BERLIN.

(FROM OUR OWN CORRESPONDENT.)

INCREASE OF HEART DISEASE.

Prof. Leschke of the Charité Hospital, Berlin, has lately been commenting on the great increase of heart diseases. Whereas the death-rate from this cause was 161 per 100,000 in 1911 it had increased to 189 in 1927. This is the more remarkable because the general mortality decreased considerably during the same period. Every form of heart disease has increased with the exception of pericarditis, while conditions due to rheumatic, bacterial, or syphilitic infection and to overstrain of the heart and vessels have become a great deal more common. During the war, and immediately after it when influenza was especially severe, endocarditis and myocarditis as a sequel to streptococcal infection were responsible for a large number of deaths. In Leschke's opinion the increase of syphilitic affections of the heart and the vessels is not a result of salvarsan therapy, as has been suggested. Of his own cases 88 per cent. had not been treated by salvarsan at all. On the other hand the beneficial action of salvarsan will not be obvious for some years, since the interval between infection and the development of syphilitic aortitis is usually between 6 and 40 years. Economic difficulties, the struggle for existence, and the influence of tobacco, spirits and strong coffee, are among the factors he holds responsible for heart disease and he advocates individual prophylaxis against circulatory fatigue. An advantageous influence is the tendency of the younger generation to abstain from spirits and tobacco and to indulge in games and sound athletic exercise.

The increase of thrombosis and embolism is sometimes attributed to the increase of intravenous injections, but the majority of sufferers have not received any such injection.

[2] Smith, M. I., Elvove, E., with coöperation of Valaer, P. J., jun., Frazier, W. H., and Mallary, G. E.: Pharmacological and Chemical Studies of the Cause of so-called Ginger Paralysis: a Preliminary Report. Public Health Reports, 1930, xlv., 1703.

POLIOMYELITIS IN GERMANY.

Infantile paralysis has become prevalent in several parts of southern Germany, especially in Baden. The source of infection is obviously Alsace, where it is said to have been common for some time. From Baden it has spread over northern Germany and up to August 16th, 510 cases had been notified in the country as a whole. Notification is compulsory and in some of the German states the health authorities must be informed if the diagnosis is so much as suspected. According to a Prussian law patients suffering from, or suspected of suffering from, poliomyelitis must be isolated; the rooms must be disinfected and child contacts are not admitted to school. In a Berlin grammar school and in certain municipal schools there have been some fatal cases and some of the classrooms have been provisionally closed. Parents whose children are attending these schools are somewhat nervous, and this has led the Municipal Health Office to make an official statement that the spread of the disease is comparatively slow and that the danger of catching it is much smaller than in scarlatina, diphtheria or measles.

A LARGE INFANT.

Dr. Kötter, writing to the *Centralblatt für Gynäkologie* describes the birth of a child 6284 g. (about 13¾ lb.) in weight and 61 cm. long. The infant was born spontaneously and labour was fairly quick, the only difficulty being that the passage of the shoulders was delayed in the pelvis. Living infants of 6000 to 7000 g. are very rare; indeed only five cases are described in medical literature. The causes of the gigantism are not fully understood; troubles of internal secretion, superabundant nourishment, diabetes, racial or constitutional peculiarities of the parents, and an abnormally quick growth of the fœtus have all been put forward as responsible.

KALLIKREIN.

Dr. Frey has reported to the Berlin Medical Society on a hormone obtained from the pancreas which exerts, he says, a powerful influence over the circulation by dilating the blood vessels. The new hormone is present in urine and disappears therefrom if the pancreas is removed. It is produced commercially under the name of Kallikrein by the Farbwerke factory and this preparation is administered by intramuscular injection. It is said to lower high blood pressure considerably, but leaves normal pressure unaffected. Low blood pressure may even slowly increase, which suggests that the hormone has a regulating action. In the treatment of angina pectoris the attacks are said to have ceased rapidly. Frey drew special attention to the excellent effects noted in intermittent claudication; in cases of early gangrene and necrosis amputation could be avoided by giving kallikrein. In the discussion of his paper good results secured in several hospitals were reported by other speakers.

A MEDICO-LEGAL QUESTION.

A remarkable judgment was recently given by the High Court in Leipzig. A patient telephoned to a medical man (Dr. A.) asking him to see her. The doctor's wife replied that he would come at once, but in her husband's absence she sent a locum tenent to the patient. The treatment given by the latter proved unsatisfactory and the patient eventually brought

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BRITISH MEDICAL ASSOCIATION.

ANNUAL MEETING IN WINNIPEG.

(*Continued from p. 542.*)

SECTIONS OF SURGERY AND TUBERCULOSIS.

AT a joint meeting of the Sections of Surgery and Tuberculosis Prof. E. W. ARCHIBALD (Montreal) opened a discussion with a paper on the scope of

Thoracic Surgery.

This was, he said, the latest of the specialties, and hitherto the best work in it had been done by general surgeons who had made it their hobby. Eventually, however, he believed that surgeons would devote their time exclusively to this one branch of surgery. Team-work was a necessity, and was now almost the rule wherever real progress was made. In his own thoracic clinic, surgeons, physicians, and pathologists worked together in close collaboration and free discussion always preceded surgical measures.

Discussing indications for treatment, Prof. Archibald said that operation should not be attempted in a tuberculous patient unless there was evidence of resistance, as shown by fibrosis or scar tissue. He divided patients into three classes: (1) "good chronics" or favourable cases; (2) conditionally favourable cases; and (3) unconditionally unfavourable cases—i.e., those with cavities or mixed infections. In his own series the operative mortality in class 1 was 3·5 per cent.; in class 2 3·6 per cent.; in class 3 28·5 per cent. The mortality thus varied directly with the class of case, so that very careful selection was required. With regard to lung abscess, two things were worth noting: first, that sometimes in the past too much had been done for such cases, since 40 per cent. of them would cure themselves if left alone; secondly, that sometimes in the past too little had been done for chronic cases. Cases of bronchiectasis could be divided into two groups: (1) the simple or uncomplicated, for which artificial pneumothorax or phrenicotomy was suitable; and (2) the complicated with chronic suppuration accompanied by parenchymatous infiltration, for which either a one-stage or a multiple stage lobectomy was indicated. The results of a one-stage lobectomy were so encouraging that this operation would probably be the rule in cases of unilobar disease.

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an action for damages against the medical man and the locum tenent. The High Court found for the plaintiff and held that not only the locum tenent but also Dr. A. was responsible; the patient had desired that Dr. A. should attend her, and from his wife's answer had concluded that this would be so. Although Dr. A. was prevented from coming the patient had made the agreement for medical attendance with him and therefore he and his locum tenent were liable to pay damages. This was the more apparent as the bill for medical attendance was sent to the patient by Dr. A.

On another judgment the High Court has decided that if the wife of a medical man, as may happen in country practice, gives first-aid to a patient in her husband's absence, she alone is responsible for any mistake she makes. But if the medical man sends a bill to the patient he becomes responsible, for his wife is then to be regarded as his unqualified assistant.

THE MEDICAL ASPECT.

Dr. R. A. YOUNG (London) thought the help that surgery could give, in those grave intrathoracic conditions where medicine was impotent or limited to palliation, was not as widely recognised as it should be—thoracic surgery was, indeed, daily giving results comparable in value with those of abdominal surgery and without prohibitive risks. The medical aspects of this development were difficult to define. They involved: (1) diagnosis of the condition; (2) assessment of the patient's suitability for operation; (3) choice of surgeon; and (4) discussion of the operative measures proposed and their adaptation to the needs of the patient. The diagnosis of intrathoracic disease, especially of morbid conditions at the bases of the lungs or of the mediastinum, might be very difficult, but fortunately there was usually time for the full investigation which was necessary. The advance in radiological technique had contributed largely to the advance in diagnosis and surgical treatment of intrathoracic disease, and complete radioscopic and radiographic investigations were now essential in almost every case. As a physician, Dr. Young deprecated exploratory puncture at random where intrapulmonary suppuration was suspected. It might be a cause of disaster if the pleura in the region of the puncture was not adherent. It was a still more difficult matter to assess the patient's suitability for operation, depending as it did on so many imponderable factors. Urologists had set physicians an excellent example in the high standard of their methods of investigating renal function before operation, and the speaker felt that there was scope for research in the matter of assessment of respiratory efficiency. A very low vital capacity might be a bar to operation. At present it was necessary to rely chiefly on a careful clinical review. Dr. Young felt strongly that the more difficult operations in that field of surgery should only be entrusted to those with special experience. Fortunately there were now teaching centres in almost all English-speaking countries where thoracic surgery of the best type could be studied and where experience could be gained. Preparation for operation should include prolonged preliminary measures for getting the patient into the best possible condition, and the provision of skilled after-care and nursing.

MALIGNANT DISEASE OF THE LUNG.

Mr. A. TUDOR EDWARDS (London) said that whether or not there had been a true increase in the incidence of malignant disease in the lung during the last few years, the incidence of cases diagnosed was certainly much higher than it was even five or six years ago. Primary malignant neoplasms in the chest were extremely insidious in their onset, and by the time the patient sought advice the mediastinal glands had usually become involved and all hopes of successful surgical removal of the growth had gone. In the lung, carcinoma apparently arose primarily in two situations—the bronchi and the parenchyma. Pulmonary endothelioma of the lung had been described, the growth being localised to a greater or less degree and consisting of masses of cells of endothelioid type. Sarcomata were much rarer than used to be thought, and many cases formerly described as sarcoma would now be classified as carcinoma.

Symptoms and signs.—Although the onset was generally gradual and insidious, many cases started with a pyrexial attack commonly labelled influenza. Sometimes the history might merely be one of increasing lassitude without localising symptoms, this symptom being later accompanied by dyspnœa or

non-productive cough. Hæmoptysis occasionally appeared early. Irregular pyrexia might also be an early symptom, but the temperature was rarely high until the later stages of the disease. Pain was never severe until the pleura or mediastinum was involved. Other possible symptoms included dysphagia from pressure upon the œsophagus of secondary deposits in mediastinal glands, and hoarseness from pressure upon or involvement of the left recurrent laryngeal nerve. The signs varied according to the type of disease. In the central or alveolar type physical signs might be altogether absent or might consist of localised dullness associated with weakened breath and voice sounds. Extrapulmonary signs included enlargement of the supraclavicular gland and paralysis of the homolateral diaphragm from phrenic nerve involvement. Evidence of venous obstruction was comparatively rare in pulmonary neoplasms. Hæmorrhagic pleural effusions might occur, these being usually late in their incidence.

Diagnosis.—The possibility of malignant disease should be suggested by the fact that the signs were not typical of any of the common lung diseases, the diagnosis being further confirmed by physical, radiological, and laboratory examination. Bronchoscopy should be undertaken wherever there was definite evidence of bronchial obstruction, as well as for patients in whom hæmoptysis was a prominent symptom but in whose sputum no specific organisms could be found on repeated search. Mr. Edwards also urged the removal of a small portion of suspected tissue for histological examination. Thoracoscopy might be of value in a limited number of cases, following the production of an artificial pneumothorax or the replacement of an effusion. In cases where the growth was superficial a definite diagnosis might be made by this means. Exploratory thoracotomy also had a definite place among diagnostic methods. When it was carried out under modern conditions and, where possible, preceded by the induction of artificial pneumothorax, exploratory thoracotomy was no more serious a procedure than abdominal operation, and entailed usually less operative discomfort to the patient. Intercostal incision with retraction of the adjoining ribs gave sufficient exposure, rendering rib resection unnecessary except in older subjects in whom the costal cartilages were ossified, or when the actual removal of neoplasms or of large portions of lung was contemplated.

Treatment.—Until recently no definite attempt had been made, apart from the various forms of radiotherapy, to treat malignant disease of the lung in an adequate way. Owing both to the insidious onset of the disease and also to the position of new growths of the lung in relation to vital structures, there were obvious difficulties in the way both of complete removal or of adequate irradiation of pulmonary neoplasms. Cases of malignant disease arising in the small alveoli or small bronchioles, which, however, unfortunately formed only a small proportion of the total cases of malignant disease of the lung, offered the best chance of surgical extirpation. Bronchial carcinoma rarely offered any hope of successful removal owing to the position of the growth and its early spread into mediastinal glands.

Where radical removal of malignant growths in the lung was impracticable, radium therapy should be considered. Three methods were available—teletherapy, external plaques, and radon seeds. Teletherapy—the application at a distance of large doses in a bomb—was painless and therefore an attractive method, but the six patients whom he had treated by this method alone had all died. The application of radium on external plaques of Columbia paste or Sorbo rubber had been used for five cases of malignant disease in the lung without, however, any improvement, save that in three cases the application had considerably relieved acute pain caused by the involvement of the chest wall by the growth. The insertion of radon seeds was another method which had definite advantages over the use of radium needles in the treatment of pulmonary growths. Even when cure was not likely, the relief given and the prolongation of life afforded by means of radium thoroughly justified the comparatively small risk entailed. Deep X ray therapy, on the other hand, was very disappointing for primary malignant lung tumours. He had never seen a patient who had benefited thereby, but the newer and more powerful types of apparatus might prove of more value.

PHRENIC NERVE AVULSION.

Dr. W. L. MANN (Winnipeg) said that collapse therapy was a natural means of curing of many lung lesions. Within a few years of the introduction of artificial pneumothorax, the first operation on the chest wall to produce collapse was done, but it was not till 1911 that paralysis of the diaphragm was suggested as an aid to collapse therapy. Dr. Mann traced the gradual improvement of the technique from the early simple section of the nerve to the realisation of the very great variation in the mode of formation of the phrenic nerve, and of the fact that a single trunk could not be assumed until well below the clavicle. Avulsion of at least 4 inches of the nerve was now the operation of choice. Discussing the signs of paralysis of the diaphragm, the speaker pointed out that the extent of the rise varied from 2 to 13 cm. and was dependent upon several factors, the most important of which was the type of lesion in the lung above. If the lesion was markedly proliferative, the diaphragmatic rise was usually great. The chief value of this paralysis was that it removed one of the forces opposing the natural healing process within the lung—i.e., the contraction of scar tissue. The paralysed diaphragm allowed collapse of scar tissue and tended to produce obliteration of cavities; it allowed a reduction in pulmonary volume varying from one-sixth to one-third; it produced a degree of pulmonary rest by removing the piston-like action of that half of the diaphragm. This affected chiefly the lower lobe, but to some extent also the whole lung. Cough and expectoration were often much easier than before. Hæmoptysis often ceased immediately after the operation; sputum might be markedly reduced in a month, cavities gradually obliterated, and general improvement in health frequently occurred. Possible dangers connected with the operation included hæmorrhage from accidental injury to the blood-vessels; air embolism following wounds of the large veins of the neck; mediastinitis, set up by drawing out the nerve through infected pleura and lung. The commoner indications for phrenic avulsion included such conditions as pulmonary or pleural cavitation, as in chronic empyema which had resisted other methods of treatment and where thoracoplasty was indicated. In bronchiectasis phrenic avulsion might be tried with or without pneumothorax. If lobectomy had been decided upon, the preliminary phrenic evulsion was of valuable assistance. The commonest indication for the operation was in the treatment of pulmonary tuberculosis, either in acute progressive cases where pneumothorax was not possible and thoracoplasty inadvisable, or as a supplementary measure in cases of incomplete pneumothorax; or,

again, in many chronic cases with cavitation and positive sputum a phrenic avulsion might allow cavities to close and symptoms to disappear. In cases of pulmonary hæmorrhage when pneumothorax was impracticable, diaphragmatic paralysis might be of great value. Avulsion should also be done as a preliminary to every thoracoplasty. While sufficient time had not yet elapsed in most of his cases to allow of a detailed analysis of the results, Dr. Mann was satisfied that it was a very valuable aid in the treatment of lung lesions requiring collapse therapy, its greatest use being in certain types of pulmonary fibrosis.

CLOSED DRAINAGE OF EMPYEMA.

Dr. J. D. McEACHERN followed with a paper on Closed Drainage in the Treatment of Empyema, including a report on 42 acute cases in infancy and childhood. The principles of modern treatment in this disease were: delay in operation, empyema not being looked upon as a surgical emergency; irrigation with Dakin's solution; and the application of negative pressure to assist in expanding the lung and thus obliterate the cavity. The closed method was slow in coming into general use, but after a personal experience in more than 50 cases Dr. McEachern had found this method so much better that he had abandoned the open method. The ages of his 42 patients ranged from 4 months to 11 years. One death occurred in the series, that of a child 14 months of age, who developed empyema after broncho-pneumonia. There was also one case of pleural shock during irrigation of the cavity by an inexperienced nurse. Except for two cases of pocketing, no case required secondary operation. The advantages of the closed over the open method were: (*a*) lessened mortality, attributed to the avoidance of general anæsthesia, the lessening both of surgical trauma and the danger of secondary infection; (*b*) lessened morbidity, the period of illness being reduced from an average of six weeks under the open method to 25 days. Another great advantage was the avoidance of the usual painful daily dressing.

PULMONARY LOBECTOMY.

The last paper of the session was contributed by Dr. N. S. SHENSTONE (Toronto) and Dr. R. M. JANES (Toronto) on Experiences in Pulmonary Lobectomy. This was based on seven cases in which one or more lobes of the lung had been removed for bronchiectasis—all of them having previously been treated for a long time by less drastic methods. No case was considered suitable for transfer to the surgical wards until lipiodol injections had, as far as possible, excluded bilateral or extensive multilobular disease. In each case the diaphragm was paralysed a few days before the major operation was undertaken. The technique adopted was modified from that originally described by Dr. Harold Brunn in his paper on One-stage Lobectomy. The reaction following operation was usually surprisingly slight, and primary union occurred in all wounds except one.

DISCUSSION.

A short discussion of the papers followed. Sir STCLAIR THOMSON spoke of some of his early experiences as house surgeon to Lister. Dr. L. S. T. BURRELL mentioned two points in regard to phrenic avulsion which he had found useful. The procedure was valuable in the case of moving mediastinum during treatment by artificial pneumothorax. He had himself found phrenic avulsion more efficacious in preventing this than the introduction of oil. The other great indication of phrenic avulsion was in terminating a prolonged period of artificial pneumothorax. Dr. H. C. PARSONS spoke of the treatment of bronchiectasis in the Hospital for Sick Children, Toronto, by lipiodol with bronchoscopy, and by postural treatment. Lord MOYNIHAN supported Prof. Archibald's plea for specialisation, but drew attention to the danger of premature specialisation. The craft of surgery, he said, was now complete, but the bounds of surgery had not yet been approached.

Mr. TUDOR EDWARDS said that there had been considerable variation in the attempts made to remove diseased portions of the lung. He thought that Dr. Shenstone had apparently made the intervals between the stages of operation too long, but in any case the one-stage operation would probably be the method of choice in the future.

SECTION OF PATHOLOGY AND BACTERIOLOGY.

AT the first session of this Section the chair was taken by Prof. ROBERT MUIR (Glasgow), and a discussion on the

Physiology and Pathology of Melanin

was opened by Prof. JAMES EWING (New York City). Masson, he said, had brought evidence to show that melanomata were the result of a diseased condition of the peripheral nervous system. His own observations had led him to agree with this contention. Examination of a deep subcutaneous nævus revealed the presence of special nævus cells, which appeared to bear a similar relationship to the nerve-fibrils entering the tumour as did the tactile corpuscles of Paccini to the nerve-fibres of the skin. Nearer the epidermis there were also pigment cells, which appeared to be derived from the nævus cells in the deeper layers. This structure led him to believe that the usual type of melanoma was essentially a tumour of nervous origin, and that the pigment was formed not by epithelial cells, as was usually believed, but by cells that took origin in the peripheral nerve-fibrils. It seemed that the pigment cells became independent of the nævus cells, and were able in certain circumstances to proliferate extensively. In support of this he showed a lantern slide of a tumour consisting purely of chromatophores; such tumours were met with in the dermis and in the epidermis as well as in the eye. In connexion with the probable nervous origin of melanomata, it was interesting to note that nævi were frequently present in cases of generalised neuro-fibromatosis, and that melanomata were not uncommonly of traumatic origin. Although believing in the nervous origin of nævi and melanomata, he would not go so far as to rule out an epithelial origin; indeed he had one case of a pigmented papilloma that undoubtedly originated in epithelium.

MELANOSIS COLI.

Prof. M. J. STEWART (Leeds) spoke chiefly on melanosis coli—the condition in which there is a deposition of melanin or melanin-like pigment in the mucous membrane of the large gut. His own observations were based on two groups of cases: (*a*) an unselected series of 600 autopsies, in which the whole length of the alimentary canal was subjected to careful naked-eye examination, but in which only selected examples were examined microscopically; (*b*) a consecutive series of 100 cases of carcinoma of the colon, in which all cases were examined both macro- and microscopically. In the first group 67 cases, 11·2 per cent., of melanosis coli were detected macro-

scopically; in the second group 55, 55 per cent., were found macroscopically and 13 further cases microscopically. The condition was rare under the age of 30, and became increasingly common over 60. The importance played by obstruction in the causation of melanosis coli was shown not only by the higher incidence in cases of carcinoma, but also by the fact that the pigmentation tended to be more intense above than below the growth. To the naked eye, the colour of the affected mucosa ranged from greyish or buff stippling, through dark grey or brown, to intense black. Pigmentation was almost always deepest in the cæcum and ascending colon, but in very advanced cases it might extend to the anus. Histologically, the pigment was generally confined to the mucosa, where it lay within the cytoplasm of large mononuclear cells. The epithelial cells, whether superficial or glandular, were invariably free from pigment, and the solitary lymphoid follicles were usually so.

The exact nature of the pigment was not clear, but it was probably intermediate between a melanin and a lipofuscin. It differed from skin melanin in its slower solubility in antiformin, and in being bleached less rapidly by hydrogen peroxide. Pick's theory of the source of the pigment, which now met with general acceptance, was that aromatic protein disintegration products absorbed from the large intestine were converted into melanin within the connective tissue cells by a tyrosinase-like ferment. This explained the importance of prolonged constipation as an ætiological factor, and the tendency for the pigment to be most intense in the cæcum and ascending colon where absorption was greatest.

BIOLOGY AND BIOCHEMISTRY OF MELANIN.

Dr. SEYMOUR HADWEN (Toronto) spoke from the point of view of an animal pathologist. He believed that animals were coloured primarily for reasons connected with their health. In Arctic animals the change to white in the autumn was a structural change and not a depigmentation. Trauma, the bites of insects, or bacterial action might result in an intensification of hair colour; on the other hand, they might injure the cells so much as to prevent their producing pigment. In horses, contrary to what was seen in man, freckles became increasingly common with age. Old horses that lost their hair colour were generally found to have melanotic tumours, and it seemed probable that in these cases the skin was being robbed of the mother substance from which the melanin was made by the tumours themselves. As a result the skin was unable to protect the sensitive tissues below, and freckling might perhaps be regarded as an attempt to bring about protection. In melanotic horses there was an excess of pigment in the epidermis in certain parts of the body, resulting in disarrangement of the basal layers; there was no evidence, however, that the surcharged cells descended into the dermis.

Prof. A. T. CAMERON (Winnipeg) discussed the biochemistry of melanin production. The old view that hæmatin was a precursor of melanin had had to be abandoned, though certain Italian workers still maintained that melanin might be a pyrrole derivative. One of the difficulties in studying this subject was to determine whether melanin was a single entity, or whether it was merely a name used to designate substances of different chemical constitution. The outstanding contributions within recent years to the biochemistry of melanin had been made by Prof. H. S. Raper, of Manchester University, and Prof. Bruno Bloch, of Zürich, the former of whom had studied the mechanism of production of melanin from tyrosine and the latter the action of dopa oxidase. It appeared probable that tyrosine was first oxidised by tyrosinase to dihydroxyphenylalanine—the so-called "dopa." This substance was then converted probably by a reaction involving dehydrogenation, to an indole derivative allied to tryptophane. By decarboxylation and a transfer of hydrogen atoms, dihydroxyindole resulted. Finally by a process of polymerisation melanin was formed. This substance had the alternative formulæ of $(C_8H_5O_3N)_n$ and $(C_8H_7O_3N)_n$, and was entirely free from sulphur or iron. It might be assumed that Bloch's dopa oxidase acted upon the tyrosine derivative dopa by the same mechanism as Raper's tyrosinase to give an identical melanin. Melanin had also been prepared from the urine of patients with secondary melanotic carcinoma of the liver, and from the nature of its preparation it was unusually pure. It was interesting to note that analysis of this urine melanin had given a figure for nitrogen very similar to that found for the melanin prepared by Raper from tyrosine. Examinations by Raper of melanins obtained from the skin of a negro, from the "ink" of the squid, and from a melanotic tumour showed no essential difference in constitution. It might be concluded, therefore, that many melanins were of almost identical structure.

The CHAIRMAN asked Prof. Ewing to define his views on the nature of the cells capable of forming melanin. He likewise drew attention to the extreme malignancy of the melanotic cell.

Prof. EWING, in reply, conceded that melanin might be produced by epithelial cells, but maintained that the nervous origin of melanomata was a view which offered the fewest difficulties in interpretation.

Prof. STEWART, in reply, said that melanomata were perhaps not so malignant as was generally supposed. The average length of life, after operation, of patients he had followed up was 2–4 years. He wished to draw attention to the importance of phagocytes in the transportation of melanin. The presence of melanin in lymphatic glands was not necessarily due to a melanotic metastasis, but might result from the transference of melanin from benign tumours.

Undulant Fever.

Prof. G. S. WILSON (London) read an occasional paper on the diagnosis of undulant fever, with particular reference to Great Britain. He remarked that infection with *Brucella abortus* might give rise to a number of conditions other than typical undulant fever, such as persistent malaise, obstinate headache, joint pains, abortion in women, and focal infections of the internal genital organs in men. In diagnosis the agglutination test was of great value, but its interpretation was often a matter of considerable difficulty. Generally speaking, a titre of 1/80 or less, in the absence of clinical symptoms, was probably indicative of past infection. A titre of 1/100 or over in the absence of clinical symptoms was suggestive of a latent infection or of repeated past infections. A titre of 1/100 or over, in the presence of pyrexia or other symptoms of disease, was practically diagnostic of brucella infection. A titre of between 1/20 and 1/100, in the presence of typical undulant fever, might likewise be considered as practically diagnostic of infection. The complete absence of agglutinins from a patient's serum did not necessarily exclude the diagnosis of brucella infection. Blood culture was clearly the most satisfactory way of establishing a diagnosis, and every effort should be made to isolate the infecting organism from the blood. Though it was generally possible in *melitensis* infections to

obtain a positive blood culture, in *abortus* infections the percentage of positive results was much lower. Sometimes the infecting organism could be cultivated from other material, such as urine, fæces, or pus. Guinea-pig inoculation was not of great value, except in the examination of contaminated material. Finally, the intradermal reaction, at least in *melitensis* infections, had been reported on favourably by several observers, and its use on an extended scale deserved trial.

Extracts of Staphylococci.

Sir KENNETH GOADBY (London) read a paper on the fractional products of the staphylococcus. Owing to the irregularity of results in vaccine therapy, he had studied the properties of extracts of staphylococci made with water, alcohol, ether, and benzoyl chloride. The aqueous extract contained butyric acid, and substances that gave positive Fehling and Molisch reactions. The alcohol-ether extract contained lipoid-like bodies, which on injection into animals gave rise to an intense local reaction, simulating a carbuncle, though without suppuration. It was probable that the lipoid fraction of the organisms was responsible for the skin reaction in vaccine therapy, and he therefore advocated the use of staphylococci which had been previously treated with alcohol and ether.

Immunological Problems in Septicæmia.

Prof. WILLIAM BOYD took the chair at the second session of the Section, when Prof. FRED T. CADHAM (Winnipeg) opened a discussion on some immunological problems in septicæmia. He intended, he said, to refer to the type of case in which the symptoms of a general bacterial invasion overshadowed those of local origin, and in which chills, sweats, and irregular temperature were associated with the finding in the blood stream of the causative micro-organism—most frequently a streptococcus. In such cases the physician turned for help to the immunologist. The failure of the body to set up an adequate resistance to the invasion of a virulent bacterium might be due to a deficiency in antibody production, or to an imperfect utilisation of the antibodies by the tissue cells. In order to ascertain whether this second possibility was determined by the absence of complementary activity from the blood, he had investigated the amount of complement in health and disease. In the serum of 500 normal persons, complement, as titrated against sensitised sheep cells, was found to exhibit but slight variation. On the other hand, in an investigation of over 1000 patients suffering from different diseases, complement was observed to vary from an increase of 20 per cent. above normal to a complete absence. As a rule the onset of the symptoms of disease was attended by a slight increase in the amount of complement; this was followed by a steady decrease till the infection reached its maximum; while during convalescence a gradual return to normal occurred. The type of fluctuation depended on the disease from which the patient was suffering. In chronic diseases such as tuberculosis, syphilis, arthritis, goitre, diabetes, and uncomplicated malignant disease, only a slight oscillation occurred in the complementary titre of the serum. But in acute infectious diseases, particularly septicæmia, the fall in titre, following the initial rise, was rapid, and in fatal cases might proceed till it reached zero. From these observations he inferred that a high complementary titre in septicæmia was of considerable value in assisting the patient to overcome the infection. He had found that a patient's blood which was deficient in complement might be reactivated, in vitro and in vivo, by the addition of small amounts of normal serum; the increase in complement that occurred lasted, as a rule, for 2 to 3 days. In the treatment of septicæmia, therefore, he advocated the intravenous injection of the patient every second day with about 30 to 40 c.cm. of normal serum from a compatible donor. On alternate days 2 to 5 c.cm. of serum, from a rabbit immunised against numerous strains of streptococci and staphylococci, including if possible the particular strain isolated from the patient's blood, should be injected subcutaneously. He had applied this method of treatment to 56 patients suffering from septicæmia, and had obtained no fewer than 45 recoveries. It must be admitted, however, that some cases of septicæmia, particularly those associated with destructive lesions in the brain or heart, were not likely to be benefited by serum therapy.

Prof. WILSON wished to know whether, in the titration of complement, allowance had been made for the natural anti-sheep hæmolysin present in human serum. In view of the fairly marked variations found by other workers in the normal complementary titre, he would like to see Prof. Cadham's actual figures, so that it might be possible to work out the standard deviation of the mean of each group, and the standard deviation of the difference between the means of the two groups of normal and diseased persons. Gunn's work did not altogether support Prof. Cadham's thesis, since he had found that complement in enteric fever and certain other diseases was generally raised during the pyrexial period, and might be present in large amount even just before death. It was very difficult to interpret the meaning of fluctuations in the complementary titre; a fall in titre might be ascribed to diminished production of complement, or to a combination of the existing complement with antibodies; unless the antibody titre was determined simultaneously, it was impossible to know which interpretation was correct. Our best results in passive immunisation had been obtained with antitoxic sera; there was less evidence that antibacterial sera were of any great value. Possibly the toxic bodies liberated by certain bacteria were non-antigenic; this might account for our failure to produce efficient anti-endotoxic sera. In conclusion, Prof. Wilson pointed out that the results of any form of treatment must ultimately be judged by statistical analysis.

Prof. OLIVER S. WAUGH (Winnipeg), speaking from the clinical standpoint, testified to the value of Prof. Cadham's work. Since extensive operations in patients with septicæmia often did more harm than good, it was of great importance to do everything to facilitate the early diagnosis of suppurative infections which might lead to septicæmia. It was probable that much might be done by prophylactic vaccination of patients about to undergo serious operations, such as removal of the rectum or the prostate.

Prof. ROBERT MUIR pointed out how difficult it was to obtain a clear idea of septicæmia. On the one hand there were cases, typified by enteric fever, in which there was a simple overflow of organisms into the blood from an infective focus; and on the other hand there were cases in which, with only a minute lesion such as a pin-prick, the circulation was flooded with bacteria. All intermediate types of case occurred. Phagocytosis played an important part in the actual destruction of micro-organisms, while antibodies were of great value in the establishment of immunity. We knew nothing of the site of complement formation, and the importance of a fall in complement was doubtful; such a fall might be

incidental rather than essential. In assessing the value of a given treatment it was necessary to submit the results to statistical examination; it was also of importance to observe the effect clinically, and he wished that clinicians would approach their cases with an open mind rather than obtain their cue from the bacteriologist.

Prof. CADHAM, in reply, agreed in the difficulty of defining septicæmia. He would not exclude the action of complement in the toxin-antitoxin reaction.

Physiology of the Parathyroid Glands.

Prof. J. B. COLLIP (Montreal) gave a general review of the physiology of the parathyroid glands. The function of these glands, he said, was to act as a regulator of calcium metabolism, but the exact mechanism by which the calcium in the circulating plasma was kept constant was still unknown. The calcium content of normal human blood serum was 9–11 mg. per cent.; of this, not more than 2 mg. per cent. was in the ionised form, about 4·5 mg. per cent. was in organic, and the remainder in inorganic combination. Calcium was of importance in the building up of the structural elements of bone and tooth, in the clotting of blood, in the coagulation of milk, and in the regulation of neuro-muscular tone and irritability. This latter effect was probably due to ionised calcium, and since changes in blood pH could influence the degree of calcium ionisation, there might be no essential difference between parathyroid tetany due to a lowered calcium content of the blood and the tetany of over-ventilation, or of alkalosis, both of which were associated with a normal blood calcium but a diminution in the ionised fraction due to an increased pH. The absorption of calcium from the alimentary canal was influenced by several factors; the soluble chloride, lactate, or gluconate was more assimilable than the phosphate or carbonate. The excretion of calcium occurred through the lower ileum and colon, and also through the kidney. There was a very close relationship between the metabolism of calcium and of phosphorus, and it was as important to determine the ratio between calcium and inorganic phosphate in the blood as to estimate the actual content of either of these bodies. A rise in inorganic phosphate led to a marked fall in the level of blood calcium.

Parathyroid hormone acted as a mobiliser of blood plasma calcium; the source of the extra calcium was bone. Injection of this hormone into the dog led to a rise in serum calcium, and if sufficient hormone was given marked hypercalcæmia developed, characterised by anorexia, vomiting, diarrhœa, muscular weakness, respiratory distress, passing of blood by the bowel, bloody vomit, collapse, and death. In man, chronic hypercalcæmia, due to increased activity of the parathyroid glands, was seen in generalised osteitis fibrosa. Calcium metabolism was influenced not only by the parathyroid secretion, but by a number of other factors such as diet, acidosis, alkalosis, exophthalmic goitre, and more particularly vitamin D. Administered in excessive amounts to dogs, vitamin D might produce fatal hypercalcæmia; this body was likewise able to relieve parathyroid tetany, and to raise the serum calcium in the parathyroidectomised animal.

Prof. Collip then proceeded to discuss various clinical conditions in which calcium metabolism or parathyroid function was disturbed. Chief amongst these were post-operative tetany, infantile tetany, alkalosis tetany, the tetany of spontaneous hypoparathyroidism, osteomalacia, hunger osteopathy, and von Recklinghausen's disease.

PHYSIOLOGICAL AND CLINICAL FINDINGS.

Prof. V. H. K. MOORHOUSE (Winnipeg) discussed the subject from the physiological standpoint. We knew very little, he said, of the mechanism by which the parathyroid glands were stimulated, and it was not clear whether nerve impulses or chemical substances were responsible. Tetany in animals, following parathyroidectomy, was characteristically a nerve-muscle disturbance; in spite of an increase in the excitability, there was a definite lengthening of chronaxy. In experimental tetany convulsions were due to the effect on the nerve centres of the mid-brain. No relation had been found between changes in the irritability of the peripheral nerves and the severity of the convulsions; this might be ascribed to a general involvement of the nervous system.

Prof. J. C. MEAKINS (Winnipeg) dealt with the diseases in which there was a disordered calcium metabolism. He pointed out that only two of these conditions, namely hypoparathyroidism leading to tetany and hyperparathyroidism leading to von Recklinghausen's disease, were due to disease of the parathyroid glands. Speaking particularly of nephrosis, he remarked that, besides albuminuria and general anasarca, there was a decreased basal oxygen consumption and a lowered calcium content of the plasma. Yet tetany never developed in this disease; this might be due to a lowering of the phosphorus content or the pH of the blood. Cases of nephrosis with a low calcium plasma content often responded well to parathyroid therapy.

Dr. D. R. MCCULLAGH (Cleveland), discussing the treatment of post-operative parathyroid tetany, said that though the calcium content of the serum might be constant, the patient's condition was variable. In such cases he had found an increase in the phosphorus content of the serum. The interesting observation had been made that an increase in blood-sugar was accompanied by a fall in phosphorus. In conjunction with his brother, Dr. E. P. McCullagh, he had, therefore, treated a series of cases by lactose, a dose of about grs. 300 being given by the mouth each day. As a result the serum phosphorus had fallen, and the condition of the patients had improved greatly.

Prof. A. T. CAMERON (Winnipeg) considered the relation between parathyroid secretion and vitamin D as joint controllers of calcium metabolism. In young rats he had found that the normal calcium content of the serum was reached only at the height of summer, but that it was possible to produce a rise in the serum calcium by feeding them with irradiated ergosterol or irradiated food. There was no definite relationship between the quantity of vitamin D administered and the rise in the serum calcium; only a relatively small amount was required to maintain a constant level of calcium. Vitamin D might be the ultimate controller of calcium, acting perhaps through the parathyroid glands.

SOUTH LONDON HOSPITAL FOR WOMEN.—An extension of the out-patients' department which has cost £65,000, raised in three years by private contributions, was opened last week.

WEST SURREY CONTRIBUTORY SCHEME.—The first annual report of the West Surrey and Aldershot Hospital League shows that on Jan. 1st last there were 26,000 members, and that there are now 30,000. During the period reviewed £10,542 was received in small weekly sums, and the Royal Surrey Hospital has benefited to the extent of more than £4000 from this source. There are probabilities of a widening of the area of the League, which was founded in June, 1928.

PUBLIC HEALTH SERVICES

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are 1929 statistics of two districts which serve in varying degree as dormitories of London :—

Name of district and estimated (R.-G.) mid-year population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant and neonatal mortality.	Young child (1–5 yr.) mortality.	Maternal mortality from childbirth.
West Ham C.B. .. (307,600)	18·7	12·7	1·12	1·22	3·2	1·8	74/—	50	2·6
Croydon C.B. (222,300)	15·3	12·5	0·89	1·48	3·2	1·4	65/26	25	3·2

Stillbirths per 100 live births: West Ham 3·4, Croydon 3·4.

West Ham.

Dr. F. Garland Collins says the housing problem, until solved, will continue to act as a check upon almost every other scheme for the promotion of the public health. He cites examples of overcrowding, typical of many others, to illustrate conditions prevailing. No municipal houses were erected during 1929.

The shortage of adequately trained nurses is becoming acute and rendered more so by the increasing number of persons seeking institutional treatment. In Dr. Collins's opinion the conditions of training, prospects, and remuneration of nurses and midwives should be investigated and revised. West Ham is a densely populated (67 persons to the acre) industrial area, as well as one of London's dormitories, with many large factories and a large dock area with resulting casual labour. During 1929 over 42 per cent. of the deaths of West Ham residents occurred in public institutions. Small-pox of the mild type continued through the year. There were 1277 notifications with three deaths, a male infant, a female 2 to 3 years, and a female 25 to 35. The small-pox hospital at Dagenham has been used for consumptives for years. In 1920 these patients had to be sent home when small-pox broke out. A similar tragedy of evacuating over 100 consumptives was averted in 1929, first by the agreement to send a limited number of small-pox cases to Orsett Hospital and subsequently by the timely action of the Metropolitan Asylums Board in admitting small-pox cases from West Ham. Dr. Collins refers to the vast amount of work entailed by this outbreak and thinks our methods of dealing with this mild type of small-pox might be modified with advantage. The fever hospital (210 beds) has the great advantage of a convalescent home at Harold Wood, about nine miles from the borough. At present there is accommodation there for 60 scarlet fever convalescents, who get the benefit of both natural and artificial sunlight. An extension is in progress of four 26-bed wards and four cubicles and should be ready for use next winter.

The Council have no maternity hospital but subsidise Queen Mary's Hospital, Stratford, and the Plaistow Maternity Hospital, in which 989 mothers were confined. There is much antenatal work. There are three clinics in connexion with the extern practice of the Plaistow Hospital, the midwives of which attended 3061 births. The two municipal antenatal clinics were well attended also, and a "follow up" system for the mothers attending was instituted in 1929 under which the health visitors paid 3149 visits to 1890 expectant mothers. The births numbered 5766 and midwives, practising privately or for associations, attended 4140 domiciliary confinements and sent for medical help in 701 instances. A large number of women were also confined in the maternity block of the guardians. The services of the municipal "home helps" were utilised by 876 mothers. In view of this extensive maternity service work the maternal mortality-rate of the last three years is interesting—viz., 3·0 per 1000 births in 1927, 2·1 in 1928, and 2·6 in 1929.

The veterinary officer, Mr. H. E. Bywater, reports that 38 per cent. of the cattle slaughtered and 3·7 per cent. of the pigs were affected with tuberculosis, and that four cows giving tuberculous milk and two with other signs were condemned under the order as the result of periodical examination of 874 cattle. He suggests an amended nomenclature for graded milks—viz.: (1) tubercle free milk (i.e., from tested herds—whether bottled on or off the farm); (2) clean milk (i.e., that now known as "Grade A"); (3) pasteurised milk. Mr. Bywater is also of opinion from his experience that an appreciable proportion of the contamination of milk by tubercle is due to lack of cleanliness in milking and to the germ-laden atmosphere of the average cowshed.

Croydon.

Dr. Oscar M. Holden says the industrialisation of Croydon makes rapid headway, and we must have no repetition of the mistakes of the industrial revolution. The influenza epidemic pressed most hardly on the old, and although the dry summer caused an increase in diarrhœa deaths of infants, the deaths of children of 1 to 5 years were fewer than in 1928—87 as compared with 96. There was a small outbreak of paratyphoid fever between the middle of June and the middle of August—37 cases of moderate severity, but with no deaths. The cause of the outbreak remained a puzzle, as the disease was not prevalent in contiguous areas at the time.

Housing conditions vary greatly though there is no large area of slums. Unsatisfactory and good areas are often adjacent. An inspection of 4000 houses showed 6·6 per cent. overcrowded, using as a standard the minimum permissible for houses-let-in-lodgings under the by-laws. Under present legislation subletting is the difficulty and a house suitable for one family may contain two or more. Houses which can be let at not more than 10s. per week are the special need. Over 16,000 gallons of milk is sold daily and 84 per cent. of it is bottled. Bottling is not necessarily a hygienic measure, Dr. Holden remarks, unless the milk put in is clean. The need for the examination of contacts of open cases of tuberculosis is not yet properly appreciated in Croydon. The occupational scheme at the sanatorium, Cheam, has had a successful year under the guidance of the instructress, Miss M. Goodman. Two orders for tapestry have kept all the women who could work busy since Easter. The scheme has been extended to home work after discharge under the occasional supervision of the instructress, who arranges for the sale of the finished articles. Some of the men continue at home the leather work learnt in the sanatorium and find their own market. A window at the dispensary is used as an exhibit to advertise Cheam products. Such a scheme does not pay expenses but it makes hours, which might be spent in idling or harmful introspection, interesting and profitable, and a hobby is doubly valuable to the tuberculous. There is a decrease in the new cases at the V.D. clinic but a satisfactory increase in the number of attendances. The nursery for ailing babies and children up to 5 years has been kept fully occupied. It nominally has accommodation for 14 babies and 2 nursing mothers, but the demand would justify extension. Ten mothers and 77 babies were

admitted during 1929—the babies chiefly for alimentary disorders, failure to thrive, re-establishment of breast-feeding, mismanagement, and so on.

In April the Council established a small home for 20 low-grade mentally deficient boys under 16. The difficulty in finding institutions for the mentally deficient has been accentuated by notice from the Metropolitan Asylums Board to remove 30 Croydon patients. It is hoped to carry out a joint scheme with the County Council for additional accommodation.

REPORTS OF SCHOOL MEDICAL OFFICERS.

—	No. on roll.	Average attendance.	Routine inspection.	Special exams. and reinspections.	Percentage of defects.
Northampton	12,557	11,219	4,398	10,788	11·8
Stockport ..	15,088	13,330	5,198	12,315	26·7
Wigan ..	13,459	12,020	4,116	8,654	24·8

Northampton.

Dr. Stephen Rowland says the outstanding circumstance connected with the service during the year was the continued presence of small-pox in the town since July, 1928. There were 112 children of school age notified, most of the cases being of the prevalent mild type liable to be mistaken for chicken-pox. None of the children had been vaccinated before exposure to infection. Less than 20 per cent. of all the children in the town from 4 to 7 are, in fact, protected, although the proportion is higher than it was last year. In 13 departments there was undoubted class infection, but it was not found difficult of control. It was not considered advisable to close any school, the scheme in operation being found to work satisfactorily, though it involved much additional work for the assistant medical officers, so that there were 600 less routine medical inspections this year. The period between routine dental inspections has become nearly three years instead of 12 months. Dental treatment has the excellent record of 2511 cases dealt with out of 2667 found to require treatment. Similarly, the results with medical and surgical defects are highly satisfactory, 93 per cent. having obtained treatment. The scheme of operation for tonsils and adenoids is working smoothly, and Dr. Rowland regards this as important, for he is convinced that, whatever may be said to the contrary in the lay press against it, nothing short of operation will be of avail in cases such as those seen at the infectious diseases hospital.

Stockport.

Dr. N. Gebbie is able to report substantial progress and a definite prospect of improved facilities. The new school at Belmont, opened in August, 1929, marks a step forward in the provision of modern accommodation; in some older buildings the heating installation, whose failure necessitated closing for a few days in the winter, has been overhauled. Structural alterations to be made at the clinic will assist the dental work, for even with two full-time dentists and assistance it has been found impossible to carry on with one surgery. Dr. Gebbie pays a tribute to the retiring dentist, Mrs. Sibson, for her skill and popularity. Parents, he says, have begun to realise more fully the importance of having their children's teeth more properly cared for, and he looks forward to the time when the system of inspection and treatment will cover all the children. A large number of children (511) are regarded as suitable for an open-air school, and a site with ideal position and environment has now been bought. For other exceptional children facilities have been wanting—there are no day special schools of any kind—but efforts to find places for them in residential schools have been unusually successful. In most of the groups a substantial number of cases have been properly dealt with in spite of the difficulties; with the epileptic there is not only the difficulty of finding accommodation but the greater obstacle of parents' refusal. Numerous voluntary agencies provide spectacles, surgical apparatus, clogs, convalescence, holidays, Christmas presents, and treats. An object of legitimate pride is the stammering class, the results of which are very promising.

Wigan.

Dr. H. Whitehead reports progress in several directions, and shows the need for more. An approved scheme for orthopædic treatment began at the end of 1927. By arrangement with the county council a special nurse attends every week at the central clinic and an orthopædic surgeon once a month. Cases for hospital treatment are sent to the Biddulph Hospital, Staffs., a fine up-to-date institution under the control of the Lancashire County Council; but the reservation of three beds does not seem large for a town of the size of Wigan. Twenty-six cases of rickets and 50 other deformities were discovered in 1929; many of these, Dr. Whitehead says, would benefit considerably at a special school or by special exercises; but he makes no note of such facilities, and apparently none exist. It is in dental work that most has been done. In September, 1928, a full-time dentist was appointed, assisted by a full-time dental nurse who visits unwilling parents; but there are still 20 per cent. who refuse treatment altogether. It is thought that improvement would follow if head teachers impressed on the children the importance of having the teeth attended to, and insisted on the consent form being returned. There are, it seems, some teachers who take a great interest in the teeth of the school-children and at their schools far more consents are given. In securing treatment for visual defect, too, Dr. Whitehead solicits more help from the teachers. Artificial sunlight treatment has yielded some good results, but attendances are irregular; treatment is given at the infirmary, a long way from many of the homes. The work done at the school clinic is badly handicapped by the inadequate building. By thorough remodelling the school at Warrington-lane has been taken off the black list of the Board of Education. One of the greatest needs of the town, Dr. Whitehead says, is an open-air school, for some 1200 children under 12 years of age are exposed to massive infection by tubercle in their homes. Such schools are badly needed in industrial towns, and no form of expenditure yields a better return for money spent. It is good news that a nursery school is to be started in the present year.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED AUGUST 30TH, 1930.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 99 (last week 93); scarlet fever, 1441; diphtheria, 923; enteric fever, 70; pneumonia, 376; puerperal fever, 29; puerperal pyrexia, 95; cerebro-spinal fever, 11; acute poliomyelitis, 23; acute polio-encephalitis, 5; encephalitis lethargica, 9; dysentery, 7; ophthalmia neonatorum, 99. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on Sept. 2nd-3rd was as follows:—Small-pox, 209 under treatment, 5 under observation (last week 209 and 4 respectively); scarlet fever, 1548; diphtheria, 1718; enteric fever, 33; measles, 146; whooping-cough, 87; puerperal fever, 23 (plus 11 babies); encephalitis lethargica, 119; "other diseases," 22. At St. Margaret's Hospital there were 14 babies (plus 8 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 4 (2) from enteric fever, 7 (1) from measles, 6 (1) from scarlet fever, 13 (2) from whooping-cough, 21 (4) from diphtheria, 52 (16) from diarrhœa and enteritis under two years, and 17 (3) from influenza. The figures in parentheses are those for London itself.

The deaths from enteric fever outside London occurred at Willesden and Sunderland. Leeds reported 2 deaths from

whooping-cough; Liverpool and Manchester each 2 from diphtheria. Diarrhœa was responsible for 11 deaths at Liverpool, 3 at Birmingham, and 2 each at Enfield, Wigan, and Salford.

The number of stillbirths notified during the week was 285 (corresponding to a rate of 43 per 1000 births), including 42 in London.

DEATH FROM SMALL-POX.

The death from small-pox reported from Wallasey during the week ended July 26th was that of a patient, aged 34, infected whilst residing in Wallasey by a mild unrecognised case which was not under treatment. Vaccination had been done in infancy but only showed a faint mark. The illness developed acutely and was of a hæmorrhagic and toxic type. The patient was removed to the Liverpool Port Isolation Hospital on July 19th and died on the 23rd. Dr. W. Hanna, medical officer of health for Liverpool, informs us that there has been no spread of the infection, no doubt as a result of prompt vaccination or revaccination and supervision of contacts.

CORRESPONDENCE

TREATMENT OF PULMONARY TUBERCULOSIS IN SWITZERLAND.

To the Editor of THE LANCET.

SIR,—As physicians who have been residing and practising in Switzerland for many years, and who are especially interested in the treatment of pulmonary tuberculosis amongst English patients, we wish to protest very strongly against the mischievous letter which appeared in THE LANCET of August 9th (p. 315) over the signature M. G. Davis.

In the first place, Dr. Davis's facts are entirely wrong. The "tourist" industry of Switzerland is not by any means its principal one, but comes fourth or fifth. There is no doubt, however, that the art of making guests comfortable and well looked after is highly developed in this country. This is also the case in Swiss sanatoria, but the puerile remarks, that in sanatoria patients suffering from pulmonary tuberculosis are induced to go to dances and cinemas against their wish, are utterly untrue and too absurd to be discussed.

Switzerland has been well known for very many years for the successful treatment of tuberculosis of the lungs. People come to this country—often after treatment somewhere else without much benefit—not only from England, but from all parts of the world, and England after all supplies but a very small percentage of the patients. Looking at it from a purely business point of view, Switzerland must be able, then, to obtain for them what they come for—i.e., an arrest of their disease. If this were not the case patients would not have come to the Swiss mountains in increasing numbers for the last 70 years, and the Swiss themselves would not have built their cantonal sanatoria for the treatment of pulmonary and surgical tuberculosis on so large a scale in the various high altitude stations at their disposal. Their example has been followed by foreign countries—e.g., Germany, Holland, Belgium, Greece, Hungary—and it is much to be regretted that England gave up the Queen Alexandra Sanatorium in Davos.

Patients come to Switzerland for treatment of pulmonary and other forms of tuberculosis because the country can offer a climate in which it is pleasurable to remain out of doors, even for those unable to take much exercise. The dry, wind-free, and sunny climate of the high altitude stations undoubtedly is a factor which England cannot provide. The Swiss sanatoria are admirably run, and the medical men superintending them are scientifically to the front. The sanatoria possess absolutely modern installations.

We are afraid that Dr. Davis's statements are not based on personal experiences, but are uncontrolled repetitions of small talk.—We are, Sir, yours faithfully,

ED. NEUMANN, M.D.,
Med. Supt., Schatzalp Sanatorium, Davos.
BERNARD HUDSON, M.D., M.R.C.P.,
Sept. 1st, 1930. Davos.

To the Editor of THE LANCET.

SIR,—May I give you the experiences of a patient of mine? I think you will agree that the patient is at least an interested party.

"A few years ago," she writes, "I entered a good private sanatorium in England as a patient. I paid £7 7*s*. a week and extras. During the first two months of my stay there it rained (literally) every day. I shall never forget the misery of the daily walks in pouring rain, the return with sodden boots and clothes, the shivering changing in a half-warmed room, the damp pouring in at the wide-open windows (envelopes kept in the drawer of a desk always stuck themselves down!), and the miserable dashes to meals—the dining-room being a building standing isolated in the grounds—under an umbrella, with the consequent necessity of always wearing old clothes, a depressing thing to a woman! I wish that your doctor correspondent who talks of the chances in England of nature study could have been there. I should like to have seen him studying the mud! And, then, the awful gloom! Bed-patients lay—often in rooms on the ground floor—watching the rain falling on the wet lawn; for the sanatorium stood in large grounds, was right in the heart of the country, and the road was not visible from the windows. The 'closed-in' feeling, *in England*, was appalling. All the women cried when they were alone. We admitted that to one another. And there were rumours about the men crying too.

"Certain private business compelled me to curtail my 'cure,' and I left the sanatorium. The business completed I tried once more, and this time went to a sanatorium in Switzerland. I paid the equivalent of £7 7*s*. a week in the summer and extras, and £8 8*s*. a week in the winter and extras. And, oh! the difference. The first thing I noticed was the *light* in Switzerland as opposed to the awful gloom in England, the exhilarating feeling of being no longer 'closed in,' for from my window I could see for miles along and over the river valley. I revelled in the glory of the ever-changing view, the sunrises (if I couldn't sleep) and the sunsets, and in winter the fascination of the ever-changing snow line. I know that the sun and the loveliness and the air helped me happily through a year of bed. And when I got up, no mud, no gloom, but fields of gentians and primulas, the pleasantness of chats with patients from other sanatoria at village cafés, and playful rivalry as to who was at the best sanatorium, and what was happening at each. (In England the villagers had viewed us with alarm!) And in winter the fun of watching sports and so the feeling of participating, to however small an extent, in the life of normal folk, instead of the terrible feeling of isolation which is, I think, the hardest thing the tuberculous patient has to bear. The sanatorium that I went to in Switzerland tried to be a hotel *for the sick*; the one in England—run by

most estimable people, I try to believe—was never anything but an institution. In it I know that my spirit was never free."

She adds: "I have been quite well for years and intend to remain so, but I can't help thinking of the other folk." I am, Sir, yours faithfully,

Sept. 3rd, 1930. M.R.C.S.

To the Editor of THE LANCET.

SIR,—Before you close the correspondence following on Dr. Harrison's article, will you allow me to refer to two excellent articles which appeared in your columns a few years ago: (1) Notes on the Value of Swiss Sanatorium Treatment (THE LANCET, 1926, ii., 580), by Dr. Alex Sandison, who had unrivalled opportunities of comparing English and Swiss treatment in the case of Ministry of Pensions patients. After weighing the relative advantages and disadvantages of Switzerland, he came to the conclusion that there are no grounds for the alleged superiority of Switzerland over other places. (2) Can as good Results be obtained by the Treatment of Pulmonary Tuberculosis in the Lowlands as at High Altitudes? (THE LANCET, 1912, i., 1127), by the late Prof. C. Saugman, who showed, as far as statistics can show anything, that the results of treatment close to sea-level are distinctly better than those obtained in the high Alps.

Saugman compared the results obtained over a period of 12 years at his Danish Sanatorium of Vejlefjord, 25 metres above sea-level, with a long series of results obtained at Turban's Sanatorium, Davos, a few years previously at an altitude of 1573 metres above the sea. The results were in favour of the low altitude. For example, taking stage I and stage II cases, those who lost their tubercle bacilli were 72 per cent. in Denmark, against 57·5 per cent. in the high Alps. Again, those admitted with fever who lost their fever by the end of their period of treatment at the sanatorium in the stage II cases were 96 per cent. in Vejlefjord and 80 per cent. in the Alps; in stage III cases 69 per cent. against 44 per cent. Further, those able to work after a period of one to seven years from the time of their leaving the sanatorium in the high Alps, and two to 10½ years after leaving Vejlefjord, were as follows: In stage I the proportion of patients from Switzerland able to work was 3·3 per cent. higher. But in stage II the percentage was 71 for Danish patients, against 54 for the high Alps; and in stage III, 24·7 for the Danish, against 16·8 for the Alpine ex-patients. These results were in spite of the fact that the average stay in Turban's Sanatorium was 222 days, against 176 days at Vejlefjord.

I am glad Dr. Savy points out in your last issue that the total hours of bright unclouded sunshine at many places in our own isles is little different from the number in the Alps—indeed sometimes higher. For example, the total hours at Lowestoft last year were 1808 hours, and the average there for the 30 years ending 1910 was 1727 hours (see Sir Leonard Hill's "Sunshine and Open Air," p. 46). On comparison with Maurer and Billwiller's "Das Klima der Schweiz," one finds that Lowestoft generally gets rather over half an hour a day more bright unclouded sunshine than Leysin, given as 4·25 hours per diem on the average of the year, and only about seven minutes less than Davos and Arosa.

One further reference. In his address at Portsmouth three months ago before the congress of the Royal Institute of Public Health (see the *Times*, June 6th), Sir Henry Gauvain said that sun treatment for its general effects, especially in surgical tuberculosis, is more effective in his estimation in the constantly changing conditions which are found in the temperate climate of England.

I am, Sir, yours faithfully,

Mundesley, Sept. 7th, 1930. S. VERE PEARSON.

THE MEDICAL TREATMENT OF CANCER.

To the Editor of THE LANCET.

SIR,—In my earlier publications due reference has been made to Prof. Blair Bell's pioneer work. As the time passes I feel the less inclined to be bracketed with him for many reasons, the chief one being that the evidence accumulates to show that the lead ion has only a secondary rôle in the treatment which we use; in fact we have great hopes that this dissentient metal will shortly be eliminated from the treatment altogether. At present we consider the ion lead simply as a vehicle for selenium. Within a week of the publication of my first provisional announcement, Prof. Blair Bell wrote to say that his chemists had had no difficulty in making lead selenide. As I had very carefully gone through his writings and found no reference to selenium, I wrote to him and asked him to contradict publicly an impression of priority which his letter would cause. This he did, and this constitutes the correspondence to which he makes allusion. Now Prof. Blair Bell repeats the programme. From his letter with its hints of correspondence and supervision he would give the impression that the whole method has been taken from him. The system as described has been originated here from the work of others and ourselves, and owes nothing more to him.

I should like to congratulate Dr. P. Gosse and Dr. J. C. Mottram on the result of combination of radiation and selenide, and I hope they will be able to supplement the list considerably in the near future. The details requested were published, at least in some of the cases, as was noted in reference 3 of my paper. In the remaining cases the dosage of radium, radon or deep X rays was the half of what that growth would have been given if radiation had been the only treatment proposed. In all, the radiation was given concurrently with selenide, or the latter was stopped when radiation was started. In view of these bad results and the steadily increasing use of D48, as shown by the sale figures of British Drug Houses, Ltd., I considered that a warning ought to be issued. I have repeatedly pointed out that this apparent adverse action is to be attributed to the selenium, for radiation after lead guaiacolate does not appear to be deleterious.[1]

I should have thought that my article was in favour of the combination of selenide and radiation therapy; perhaps Drs. Gosse and Mottram will read it again. I am employing the two concurrently in an increasing number of cases, and so far have reason to be pleased with the results. Perhaps a brief account of a recent case may be of interest; it is chosen from several, full accounts of which will probably appear when proof is regarded as adequate.

A girl, aged 25, had her leg amputated through the upper third of the femur for periosteal sarcoma of the tibia. This was followed by recurrence in the femoral stump, and she was referred to me about a year ago. She was treated by the method we have evolved in Bristol, but growth continued slowly, and in June of this year she appeared to be dying; she was much emaciated, had much pain, suffered much from cough and dysphagia. A skiagram showed her lungs and mediastinum to be riddled with large metastases. I then changed her treatment to a selenide not of lead, at present in the experimental stage, and asked for concurrent radiation. A trial dose of deep X rays, one eighth of the carcinoma dose, was followed by slight alteration of the blister leucocyte count; therefore she was given this eighth dose twice weekly, alternately to chest and stump; the selenide was given weekly. I expected that she would not be alive when I returned from holiday early in August, but found her very much better. She had put on weight, lost dysphagia and cough, and another skiagram showed considerable diminution

[1] Brit. Med. Jour., 1929, ii., 325: THE LANCET, 1930, i., 906; and ii., 389.

of the pulmonary masses. I should here record my thanks to Dr. Mayes and the radiological staff of the Bristol Royal Infirmary for their help in this work.

I hope that Drs. Gosse and Mottram will continue their researches, for this aspect of the problem—the combination of selenide and radiation—requires more time than I can give, and a knowledge of radiation to which I cannot lay a claim.

I am, Sir, yours faithfully,

Bristol, Sept. 8th, 1930. A. T. TODD.

PATHOLOGY OF DIABETES.

To the Editor of THE LANCET.

SIR,—Just 25 years ago, in my Goulstonian Lectures (published in your columns [1]), I suggested that diabetes mellitus was a disorder of fat-metabolism, associated with some defect of the pancreas. I gather from Prof. J. J. R. Macleod's Oliver-Sharpey Lectures that all we now know is that diabetes is due to lack of insulin, and that much, at all events, of the sugar comes from fat. May I claim to have made at least an intelligent anticipation of the state of pathological theory a quarter of a century ahead?

I am, Sir, yours faithfully,

WM. CECIL BOSANQUET.

Nottingham-place, W., Sept. 6th, 1930.

LONDON RUBBISH.

To the Editor of THE LANCET.

SIR,—Your leading article is timely. I think it is high time someone drew the attention of the public to the defects in our sanitary services. In the neighbourhood in which I reside the household refuse is left outside the houses for collection in buckets, generally without covers, or without being covered. Owing to their small size they are usually filled to overflowing, this resulting in their contents being blown about the streets. Between 8 and 10.30 A.M. an open lorry appears and the contents of the buckets are chucked anyhow into it with the maximum of noise and clatter. The lorry is gradually filled, also to overflowing, some of the contents of the buckets are distributed about the streets in the process of being emptied, and the streets are further defiled as the lorry jolts along, especially if there is any wind.

We are entitled to be relieved from these insanitary and unsightly methods of refuse removal in view of the enormous expense we are put to for the provision of sanitary services. We should have up-to-date covered wagons, designed to obviate leakage when loading or moving about the streets. These can be seen in quite small continental towns. It should be compulsory for the householder to provide adequate receptacles of standard pattern, and they should be covered when outside the house. The men who carry out the duties should be provided with clean overalls or smocks, and encouraged to keep themselves as clean as may be.

The above-mentioned defects are not peculiar to the neighbourhood in which I live, for one day last autumn at 4.15 P.M. I had part of the contents of one of these dreadfully insanitary open lorries blown into my face—and this in a street overburdened with experts in sanitary science.

I am, Sir, yours faithfully,

LEONARD MOLLOY.

Harley-street, W., Sept. 6th, 1930.

[1] THE LANCET, 1905, i., 903, 977, 1053.

OBITUARY

LEONARD PORTAL MARK, M.D. Brux., M.R.C.S. Eng.

THE death of Dr. Leonard Mark on Sept. 5th, at his house in Oxford-terrace, brings to an end a career which combined medicine and art in the service of his fellows. Leonard Portal Mark was born at Marseilles in 1855, the second son of Edward Wallhouse Mark, who was at that time British Consul there. He was educated in France which gave him the lifelong advantage of being bilingual, and entered St. Bartholomew's Hospital from which he qualified M.R.C.S. in 1879, and L.R.C.P., L.S.A. in 1881. He held house appointments at the Sussex County Hospital, the Richmond Hospital, the General Lying-in Hospital at Lambeth, and the Bethlem Royal Hospital, thus obtaining an all-round experience of disease. He then settled in Paddington where he gradually built up a considerable general practice, but his heart was in his artistic work, and after having made a hobby of etching he was appointed pathological artist at St. Bartholomew's Hospital. Although a practised hand at depicting the evidences of disease in others, it is a curious fact that he had borne himself for 13 years the facies of acromegaly before becoming aware of it. "Each day," he wrote in his autobiographical study, "when I looked into the glass to brush my hair, there was a typical acromegalic literally staring me in the face. Yet I never recognised the fact." It was in 1892, he tells us, in the ABC shop in Little Britain to which Bart.'s men then resorted, that he told Sir Archibald Garrod of his increasing effort to make his jaws meet. Garrod, who already knew of Mark's eye symptoms, made the diagnosis, but kept it to himself. In November, 1905, Mark was crossing Cavendish-square when the self-revelation came, and on returning home found his own condition described in Bowlby's "Pathology." Although the disease took its usual course with severe headache and increasing disability, the philosopher in Mark transcended the patient, and he not only published his personal experience of the disease, but contributed to our own columns a study of Richard Dickinson of Scarborough, shoe-cleaner and gingerbread vendor, whose portraits by seven contemporary artists betray the stigmata of acromegaly. The 1726 portrait of Dickinson is probably the first representation of acromegaly to be found in this country, although earlier ones were recognised on the continent. Some acromegalic features Mark found too in the physiognomy and temper of the Punchinello of our street show. Mark bore his sufferings with great courage, and it gratified his friends to know that his headaches became less severe as he became more infirm. He was careful to preserve a series of photographs to serve as a record of the progress of his disease. Apart from his writings on acromegaly he collaborated in the translation of Pozzi's "Gynæcology" in three volumes issued by the New Sydenham Society. He was at one time President of the West London Medico-Chirurgical Society, and Vice-President of the Harveian Society.

"THE ROYAL PLYMOUTH HOSPITAL."—The governors and subscribers of the Central Hospital, Plymouth, have agreed, in principle, to the amalgamation of that institution with the South Devon and East Cornwall and Royal Albert Hospitals under the style of "The Royal Plymouth Hospital." The object is coöperation and coördination.

MEDICAL NEWS

National Council for Mental Hygiene.

A series of lecture-discussions has been arranged by this Council, and will be held at the rooms of the Medical Society of London, 11, Chandos-street, Cavendish-square, W., at 5.15 P.M. on certain Thursdays in October and November. Dr. G. W. B. James will start the course with a lecture entitled a Physician Looks at History (Oct. 16th); Dr. Alice Hutchison will speak on Preventive Treatment in Childhood (Oct. 23rd); Dr. Edward Mapother on Alcoholism and Drug Addiction (Oct. 30th); Prof. William Brown on Mental Conflict and the Development of Character (Nov. 13th); Dr. Doris Odlum on the Psychology of Adolescence (Nov. 20th); and Dr. R. G. Gordon on the Importance of Mental Deficiency (Nov. 27th). Tickets are obtainable from the Secretary of the Council, 78, Chandos House, Palmer-street, S.W. 1, or at the doors.

The second Mental Health Conference organised by the Council will be held in May, 1931.

A Faculty of Medicine for Marseilles.

The premier seaport town of Marseilles, which is already the seat of a medical school, is to become endowed with a regularly constituted medical faculty. This result has only been attained by slow degrees, for the establishment of the faculty was for long held in suspense. The site and various parts of this new institution is to be the Pharo Palace, which was constructed on behalf of the late Empress Eugénie. The chateau is attractively situated, overlooking the sea.

Lectures on Medical Hydrology.

The Committee for the Study of Medical Hydrology is arranging its programme for the coming winter. The object of the Committee is to supply lecturers, on the subjects of spa treatment and general medical hydrology, for medical societies and for medical schools where these subjects are not already included in the curriculum. A list of the lecturers available will be forwarded on application to Dr. Geoffrey Holmes, 11, Ripon-road, Harrogate.

International Society of Medical Hydrology.

The annual meeting of this society is being held this year in Lisbon and the Portuguese spas, from Oct. 15th-23rd, in conjunction with the Congrès international d'Hydrologie. One medical discussion is being arranged by the Society, on the Treatment of Digestive Disorders by Waters and Baths. General meetings will also be held to consider a system for the international registration and classification of waters, the organisation of health resorts for insured workers (social hydrology), and proposals for the protection of the names of the spas. The Portuguese spas to be visited include Coimbra, Curia, Oporto, Bussaco, and Vidago. The meeting is open to non-members and a limited number of medical practitioners and students interested in hydrology are invited to take part. Applications should be received at the office of the Society, 55, Wellington-road, London, N.W. 8, not later than Sept. 15th. The journey to Portugal may be made by sea from Boulogne, or overland.

Donations and Bequests.

Mr. W. J. R. Pochin, of Wigston, Leicestershire, left £1200 to the Leicester, Leicestershire, and Rutland Institution for the Blind.—Miss E. E. Oates, of South Royde, Halifax, Yorks, left £1000 to the Royal Halifax Infirmary.—Mrs. I. N. Whipp, of St. Annes-on-the-Sea, who left £12,269, left £500 in trust for the relief of the poor of Clitheroe, £300 to the Cripples' Home, Strangeways, Manchester, £200 to St. Mary's Hospital, Manchester, and one-third of the residue of the property to the Blackburn Infirmary.—Elizabeth Lady Smiley, of Park-street, London, W., Forest House, Bournemouth, and Larne, Co. Antrim, among other bequests left £3000 to the Smiley Cottage Hospital, Larne, Co. Antrim, £5000 to the Royal Victoria Hospital, Belfast, £6400 to the Royal Alexandra Infirmary, Paisley, and £5000 to the Hugh Smiley Day Nursery, Paisley.—Mr. Joseph Watson, of Bramhall, left £1000 each to the Salford Royal Hospital, the Manchester Royal Infirmary and Dispensary, and the Ancoats Hospital and Dispensary; also £500 each to the Coal Smoke Abatement Society, Manchester, and the Northern Counties Hospital for Incurables, Mauldeth.—Fleet Surgeon A. T. Corrie, R.N. (retd.), Plymouth, left £32,473. He gave £1000 each to the Cripple Home for Boys at Kensington, the Royal United Service Orphan Home for Girls, Devonport, and the Orphan Home for Girls at Lockyer-street, Plymouth; and £500 to the Corporation Grammar School, Plymouth. After a personal bequest of £1000 he left the residue of the property to St. Bartholomew's Hospital.

Lectures in Tropical Hygiene and Nursing.

The County of London Branch of the British Red Cross Society (27, Grosvenor-place, S.W.1.), has arranged a course of nine lectures and demonstrations on Tropical Hygiene and Nursing, to be given at 8 P.M., on Wednesdays, from Oct. 1st, at 27, Grosvenor-place.

Middlesex Hospital Medical School.

Mr. Eric Pearce Gould will give the introductory address when the ninety-sixth winter session of this school opens at the Queen's Hall, Langham-place, on Wednesday, Oct. 1st. Mr. Arthur Greenwood, the Minister of Health, will take the chair at 3 P.M., and distribute prizes gained during the past year. After the ceremony the wards of the new west wing, the new nurses' home, the medical school, and the research department will be open for inspection.

Queen's Hospital for Children.

Last year new out-patients (30,806) showed a reduction of about 4000 which the annual report attributes to the continued improvement in public health organisation. Each out-patient cost 6*s*. 3*d*. There were 1969 in-patients who cost £12 13*s*. 7*d*. each. The income was £34,998, and the expenditure £33,135. A debt of nearly £10,000 has been reduced to £3225, and the hospital has paid its way since 1924, but money for extensions is now needed.

Royal Sanitary Institute.

Dr. G. F. Buchan will preside over a sessional meeting of this Institute, to be held at Hereford on Saturday, Oct. 4th. The Mayor (Mrs. Luard) will open a discussion on the Place of Women in Local Government, Mr. G. H. Jack, F.R.I.B.A., on the Preservation of the Countryside, and Mr. J. R. Barker, M.R.C.V.S., on the Health Authority and the Milk Supply.—At a sessional meeting at Nottingham on Friday, Oct. 10th, Mr. A. R. Atkey will speak on River Pollution, and Dr. L. P. Lockhart will open a discussion on Industrial Medicine in Relation to Public Health. Dr. Charles Porter will take the chair.

Paddington Medical Society.

At a meeting of this society held at the Great Western Hotel on Sept. 9th, Dr. E. G. Graham Little, M.P., spoke of the imminence of a scheme for a State medical service, and of the drawback to extension of contract medical practice on existing lines. Mr. E. B. Turner said that while medical benefit under the Insurance Act was working well in rural districts, the situation was different in urban districts where there were rumblings of a coming storm. In the discussion which followed attention was called to the increase of voluntary contract practice in the work of the London Public Medical Service, and to the need for those actually engaged in practice to make their views effectively known.

Royal Institute of Public Health.

The Harben lectures for 1930 will be given at this Institute by Prof. William H. Park, of New York, at 4 P.M. on Oct. 6th, 7th, and 8th. His general subject will be Pneumonia, and the three lectures have the following titles: (1) the Types of Pneumococci in Adults and Children and Their Significance; (2) the Epidemiology; the Refining of Anti-pneumococcus Serum; (3) the Therapeutic Use of Vaccines and Antibacterial Sera.—The address of the Institute is 37, Russell-square, London, W.C. 1, and no ticket of admission is required.

A course of lectures on the Prevention of Accidents, Disorders, and Diseases, is to be given at the Institute at 4 P.M. on Wednesdays from Oct. 15th. The speakers will be Dr. E. Graham Little, M.P., on the Prevention of Accidents, Disorders, and Disease in Members of the Medical and Nursing Professions (Oct. 15th); Prof. W. S. Lazarus-Barlow, M.D., on the Prevention of Pre-cancerous States and the Arrest of Cancer (Oct. 22nd); Lieut.-Colonel J. A. A. Pickard on the Prevention of Street Accidents (Oct. 28th); Prof. S. Lyle Cummins, M.D., on the Prevention of Tuberculosis (Nov. 5th); Dr. R. Stenhouse Williams on the Importance of a Complete Study of the Nutritional Value of Milk (Nov. 12th); Dr. Arthur Massey on the Prevention of Venereal Disease (Nov. 19th); Mr. Leonard Ward on the Prevention of Accidents in Factories and Workshops (Nov. 26th), Prof. D. B. Blacklock, M.D., on the Prevention of Disorders and Diseases in Tropical Countries (Dec. 3rd); Sir Hubert Bond, M.D., on the Prevention of Mental Illness (Dec. 10th); and Prof. E. L. Collis, M.D., on the Prevention of Industrial Diseases (Dec. 17th).

Royal Waterloo Hospital.

Last year out-patients' attendances increased from 56,000 to nearly 70,000, and the department will have to be further extended, but the cost of land in the vicinity of the hospital makes the problem difficult. The surplus of income over expenditure was used to reduce the accumulated deficits, which now stand at £2797.

West Kent Hospital.

The ninety-seventh annual report of the West Kent General Hospital, Maidstone, shows that last year there were 1251 in-patients who cost 10*s.* 5*d.* per day and stayed an average of 23·3 days. Including casualties there were 9899 new out-patients. The cost per occupied bed was £190 1*s.* 9*d.* There are 102 beds, 8 of them for paying patients. The Pay Day Fund provided the hospital with £3746. Extensions costing over £50,000 are in progress; they include three new wards and additional accommodation for the nursing staff. The new wards are being given (£30,000) by Mr. and Mrs. G. Foster Clark.

Arsenic in Sweets.

About 30 children have been taken ill in Staffordshire and Cheshire after eating sweets made at a small factory at Burslem, Stoke-on-Trent. It is stated that the arsenic was contained in a dusting powder used to prevent the sweets from adhering to each other. As much as two-thirds of a grain has been found in a single sweet, but as yet there have been no fatal cases of poisoning. Efforts are being made to trace all the supplies distributed to retailers, and 50 bottles have been confiscated. It is believed that several hundredweight of the sweets have been sent out to shopkeepers in an area stretching from Crewe to Leek, including Congleton, Burslem, and Newcastle (Staffs.) The factory has been closed, and parents have been warned to send for medical aid if a child shows signs of illness after eating boiled sweets.

Vacancies

For further information refer to the advertisement columns.

Ascot, Heatherwood Hospital.—Res. Asst. M.O. £300.
Barnsley Beckett Hospital and Dispensary.—Jun. H.S. £140.
Barnstaple, North Devon Infirmary.—Res. M.O. At rate of £150.
Bath, Royal United Hospital.—Asst. H.S. At rate of £120.
Bedford County Hospital.—H.S. £175. Also Asst. H.S. £130.
Birmingham, Ear and Throat Hospital, Edmund-street.—Res. Anæsthetist. At rate of £150.
Birmingham, Selly Oak Hospital.—Cas. O. £200.
Blackburn Royal Infirmary.—4th H.S. £150.
Bradford City.—H.P. for Grassington Sanatorium. £225. Locum Assistant Pathologist. £12 12*s.* weekly. Vacancies on Staff of City Pathologist and Bacteriologist. £600.
Brighton, Royal Alexandra Hospital for Sick Children.—H.S. £100.
Brighton, Royal Sussex County Hospital.—Cas. H.S. £120.
Bury Infirmary, Lancashire.—Third H.S. At rate of £150.
Cambridge, Addenbrooke's Hospital.—H.S. Also H.S. to Special Depts. Each at rate of £130.
Cardiff City Council, P.H. Dept.—Half-time Pupil Asst. M.O. £250.
Cardiff, King Edward VII. Welsh National Memorial Association. Area Asst. Tuberculosis Phys. £600. Also half-time Asst. Tuberculosis Officer for Pontypridd area. £300.
Chesterfield and North Derbyshire Royal Hospital.—H.S. At rate of £100–£175.
Colchester, Essex County Hospital.—Asst. H.S. and Reg. £120.
Colchester, Royal Eastern Counties Institution for the Mentally Defective.—Research Worker. £750.
Connaught Hospital, Orford-road, E.—H.P. At rate of £100.
Dartford, Kent, City of London Mental Hospital.—Jun. M.O. £100.
Derby, Derbyshire Hospital for Sick Children.—Res. M.O. At rate of £150.
Dorchester, Dorset Mental Hospital.—Jun. Asst. M.O. £350.
Dublin, Richmond, Whitworth and Hardwicke Hospitals.—Hon. Phys.
East Ham Memorial Hospital, Shrewsbury-road, E.—Res. M.O. At rate of £200. H.P. At rate of £150. H.S. At rate of £120.
Essex, Administrative County of.—Asst. County M.O.H. £500–£700.
Gloucester, Gloucestershire Royal Infirmary and Eye Institution.—Second H.S. At rate of £120.
Great Yarmouth General Hospital.—Sen. and Jun. H.S.'s. £150 and £140 respectively.
Grimsby and District Hospital.—Res. M.O. £200.
Guildford, Royal Surrey County Hospital.—H.S. £150.
Hertford County Hospital.—Res. Surg. O. At rate of £250.
Hôpital Français, 172, Shaftesbury-avenue, W.C.—Jun. Res. M.O. £100.
Hospital for Sick Children, Great Ormond-street, W.C.—H.S., and H.P. Each at rate of £100.
Hospital for Women, Soho-square, W.—Res. M.O. At rate of £100.
Ilford, King George Hospital.—Asst. Res. M.O. £250. Also House Officer. £100.
Infants Hospital, Vincent-square, Westminster.—Two H.P.'s. Each at rate of £75.
Inverness District Mental Hospital.—Jun. Asst. M.O. £350.
Inverness Northern Infirmary.—3rd. Res. M.O. At rate of £100.
Ipswich, East Suffolk and Ipswich Hospital.—Cas. O. £150. Also H.S. At rate of £120.
Islington Dispensary, 303, Upper-street, N.—Asst. Res. M.O. £250.
Kingston-upon-Hull, City and County of, Beverley-road Institution.—Asst. M.O. £300.
Lanark, County of.—Bacteriologist and Pathologist. £750.
Lancashire County Council.—Asst. County M.O. £800.
Lancaster County Mental Hospital.—Asst. M.O. £350.
Liverpool and District Hospital for Diseases of the Heart.—H.P. At rate of £52.
Liverpool Open-Air Hospital for Children, Leasowe.—Jun. Res. M.O. £200.
London Lock Hospital, 91, Dean-street, W.—Two H.S.'s. Each at rate of £200.
Macclesfield General Infirmary.—Res. H.S. At rate of £180.
Manchester, Ancoats Hospital.—H.S. At rate of £100.
Manchester City Education Committee.—Asst. School M.O. £600.
Manchester Royal Infirmary.—Jun. Asst. M.O. for Radiological Dept. £100.
Manchester Victoria Memorial Jewish Hospital, Cheetham.—Sen. H.S. £250.
Merthyr General Hospital.—Res. H.S. At rate of £150.
Miller General Hospital, Greenwich-road, S.E.—Cas. O. At rate of £150. Also H.P., and H.S. Each at rate of £125.
Narborough, near Leicester, Leicestershire and Rutland Mental Hospital.—Locum Tenens. M.O. 7 gns. a week.
National Hospital, Queen-square, W.C.—Res. M.O. £200.
Newcastle-on-Tyne, Royal Victoria Infirmary.—Hon. Surgeon to Throat and Ear Dept.
Newcastle-upon-Tyne, Hospital for Sick Children.—Jun. H.S. At rate of £100. Also Res. H.P. and Res. Sen. H.S. Each at rate of £95.
New Zealand, Christchurch Hospital Board.—Med. Reg. £500.
Northampton General Hospital.—H.P., Two H.S.'s, and Two Asst. H.S.'s. Each at rate of £150.
Northwood, Middlesex, Mount Vernon Hospital.—H.S. £200.
Nottingham Children's Hospital.—Res. H.S. At rate of £150.
Nottingham General Hospital.—Cas. O. Also H.P. Each at rate of £150.
Oldham Royal Infirmary.—Two H.S.'s. Each at rate of £175.
Plymouth, City Hospital.—Res. M.O. £350.
Pontypridd Women's Welfare Centre.—Woman Doctor for Birth Control Clinic. 1½ gns. per session.
Poole, Dorset, Cornelia and East Dorset Hospital.—H.S. At rate of £150.
Portsmouth Royal Hospital.—Sen. H.S. At rate of £175. Also H.P., Two H.S.'s, and Cas. O. At rate of £130 and £100 respectively.
Preston and County of Lancaster Royal Infirmary.—H.S. At rate of £150.
Princess Louise Kensington Hospital for Children, St. Quintin-avenue, N. Kensington, W.—H.S. and Cas. O. At rate of £75. Also Hon. Physician and Hon. Radiologist.
Reading, Royal Berkshire Hospital.—Cas. O., and Res. Anæsthetist. At rate of £150.
Royal Free Hospital, Gray's Inn-road, W.C.—Asst. Physician.
Royal Waterloo Hospital for Children and Women, Waterloo-road, S.E.—Hon. Clin. Asst.
St. Bartholomew's Hospital, E.C.—Asst. Surgeon for Diseases of Throat and Nose. Asst. Surgeon to Orthopædic Dept. Also Asst. Dental Surgeon.
St. Helen's Hospital.—H.S. £250.
Salford Royal Hospital.—H.S. to Orthopædic Dept. Also H.S. Each at rate of £125.
Salop County Council.—Asst. M.O. £600.
Sheffield Royal Hospital.—Res. H.S. Res. Anæsthetist. Two H.S.'s. Also Ophth. H.S. All at rate of £80.
Shrewsbury, Eye, Ear, and Throat Hospital for Shropshire.—H.S. £200.
Southampton, Royal South Hants and Southampton Hospital.—Asst. H.S. At rate of £180.
South Shields, Ingham Infirmary.—Jun. H.S. £150.
Stafford, Staffordshire General Infirmary.—H.S., and H.P. At rate of £200 and £150 respectively.
Stockport Infirmary.—Res. Surg. O. £250. Also H.P. £175.
Swansea Hospital.—H.S. £150.
Talgarth, Breconshire, Mid-Wales Counties Mental Hospital.—Asst. M.O. £350.
Taunton and Somerset Hospital.—Sen. H.S. At rate of £150.
Victoria Hospital for Children, Tite-street, Chelsea, S.W.—H.S. At rate of £100.
Walsall General Hospital.—H.S. At rate of £150.
Walsall, Manor Hospital.—Res. Asst. M.O. £200.
Warrington, Whitecross Hospital.—Asst. Res. M.O. £225.
West Lothian, Bangour Mental Hospital. — Second Asst. M.O. £350.
Wigan County Borough Education Committee.—Asst. School M.O. £500.
Wolverhampton and Midland Counties Eye Infirmary.—H.S. £150.
Woolwich and District War Memorial Hospital, Shooters Hill, S.E.—H.S. At rate of £100.
Worcester, Besford Court Catholic Mental Welfare Hospital for Children.—Res. Med. Reg. At rate of £150.

The Chief Inspector of Factories announces vacant appointments for Certifying Factory Surgeons at Littlehampton (Sussex), Flint (Flintshire), and Glenluce (Wigtownshire).

The Home Secretary gives notice that in consequence of the resignation of Dr. David Duke Monro, Medical Referee under the Workmen's Compensation Act, for Wigtown County (Sheriffdom of Dumfries and Galloway), the appointment held by him is vacant. Applications for the post should be addressed to the Private Secretary, Scottish Office, Whitehall, London, S.W.1, and should reach him not later than Sept. 27th.

NOTES, COMMENTS, AND ABSTRACTS

AN EXPERIMENTAL WORKSHOP COLONY FOR TUBERCULOSIS AT BRESLAU.

THE colony established by the Society for the Control of Tuberculosis at Breslau in the grounds of the Municipal Tuberculosis Hospital of Breslau-Herrnprotsch has now been running for a year. It was opened on July 1st, 1929. Out of 32 houses intended for the use of one family, 30 had been let by May 1st, 1930, and in the two homes for unmarried persons, 27 of the 35 beds had been taken by women; 8 single men are living as sub-tenants in the family houses, and applications have been made for the remaining accommodation, so that the colony is almost full.

THE PROBLEM.

The workshop colony is an attempt to solve the housing problem for persons who are unsound, or incapable of complete recovery, by offering them treatment for an indefinite period under conditions which are favourable to work, and which at the same time leave the invalid in the care of his family. The arguments urged against dwelling-colonies for tuberculous patients do not affect workshop colonies, which should be regarded as a necessary complement of the tuberculosis hospital; the introduction of work therapy should be contemplated from the beginning in planning future hospitals. The conception of a combination of a hospital and a workshop colony was first put into practice at Papworth, where institutional treatment is given to those persons who need it for a limited period, while treatment of long duration is carried out by the domestic and medical provisions of the work-shop colony.

The Breslau Society for the Control of Tuberculosis undertook the scheme in 1927 at the instigation of Dr. Ernest Brieger, who had studied the Papworth plan closely, and is now more firmly convinced than ever that a work-shop colony can only be developed with success in connexion with an institution, and under the direction of the physician in charge.

The plan followed by which houses of four to five rooms intended for the use of one family only were built, has the advantage that the affected person can live in the upper story almost completely isolated from the family. For families without children the houses are somewhat expensive, and in future a certain number of smaller and simpler houses will be built. Arrangements have been made to allow the heating for the small houses to be introduced from the two homes for unmarried persons. In each house a small kitchen is supplied which is not intended or constructed as a living room, and food is cooked by gas, an average gas bill reaching from 8 to 15 marks per head. The invalid's room is let suitably furnished, and under the hire-contract no further furniture may be installed. The same principle holds in the homes for unmarried persons, each of whom occupies a room to herself, with running water laid on.

FINANCE.

The cost of the whole project, including inside fittings, was between one and two million marks, of which 160,000 were lent by the Imperial Insurance Institution at 6 per cent., 150,000 by the General Local Sick Fund of Breslau, at 7 per cent., and 600,000 by the National Insurance Institution of Silesia, at 6 per cent.; 25,000 marks were placed at the disposal of the Society by the Imperial Ministry of Labour, and 2000 marks each by the German Central Committee and the Ministry of Welfare, respectively. The interest on this capital could clearly not be raised from the tenants themselves. The rent has been fixed at 115 marks per month, a figure which it will be possible to maintain as long as an annual subsidy of 7000 marks is received from the tax on house-rent. Rent of a furnished room is 100 marks, but such sums cannot be borne by the tenants alone; the National Insurance Institution has granted 2·50 marks per day for married or single patients. The remaining 40 marks per month are raised by the tenant and, in the case of married recipients of benefit, the town of Breslau plays a part; in the case of unmarried persons the Welfare Bureau makes a contribution. Most of the patients have passed through the hospital either for examination and observation or for prolonged periods of treatment; they are selected by a committee, and persons belonging to other localities have been excluded from the first. Progressive and hopeless cases were also rejected, and preference given to patients in whom a clinical cure might be expected following protracted treatment under favourable conditions.

THE WORK.

The work offered has been suited to the capabilities and tastes of the workers; tailoring, locksmith's work and joinery are some of the trades in which patients are employed. The directress of the sewing-room was a patient for three years and has designed a new form of invalid attire; the whole of the necessary linen of the Herrnprotsch Institution is now being produced in the workrooms, which are equipped with electric sewing and knitting machines. Patients work two to four hours daily, and their wages amount from 20 to 50 marks a month. Joinery is carried on as a self-supporting trade, and coffins are produced for the municipal infirmaries at the rate of about 40 a month. In the locksmiths' workshop, steel house fittings are manufactured, and will bring in a living wage as long as sufficient work can be found. The bookbinding section is beginning to make headway, although it is still unremunerative.

The effects of the scheme, almost throughout, have been an improvement in the weight, depression and clinical and X ray findings of the patients, who are with difficulty restrained from doing more than the prescribed amount of work. The difficulty of maintaining the supply of employment is still a serious one, and a work period of more than four hours at a time cannot be guaranteed. Although it is too early to judge of the ultimate success of the colony, the initial success cannot be denied. It is creditable to have ensured a suitable way of life for 80 cases of recognised tuberculosis, but it is even more satisfactory to have provided a healthy environment for 60 children coming of tuberculous parentage. Careful supervision is exercised, and the children are all radiographed and examined at intervals; a school and kindergarten are in the process of erection.

THE FUTURE.

Without energetic help from all classes of the community, constructive work is impossible in these days of economic need. Without assistance the work from the National Insurance Institution shops could not have been developed, and even yet they are housed in unsuitable quarters. There is reason to hope, however, that the German Central Committee will offer such support as will make the construction of modern work-shops possible. Dr. Brieger, who is in charge of the hospital and colony, is cautious in his estimate of the value of the scheme.[1] It is easy, he says, to start. The difficulties will only become fully apparent when the new principle has been carried out in its entirety.

[1] Tuberkulose-Fürsorge-Blatt, 1930, No. 5.

FOOT-AND-MOUTH DISEASE.—The Ministry of Agriculture announces that foot-and-mouth disease has appeared at Holbeck, Leeds. This is the first outbreak in Great Britain this year.

PATHOLOGICAL AND BACTERIOLOGICAL LABORATORY ASSISTANTS' ASSOCIATION.

TRIENNIAL CONFERENCE.

THE third triennial conference was held in the medical school of the University of Manchester from August 25th to 29th. The conference was opened on August 25th by Dr. W. H. Lang, D.Sc., F.R.S., Prof-Vice-Chancellor and Barker Professor of Cryptogamic Botany in the University. He emphasised the value of the skilled assistance and coöperation of laboratory assistants in any research work and congratulated the association on its efforts to raise the status and improve the training of technical assistants. The vice-president, Mr. C. W. Ashton, then welcomedthe members to Manchester. The mornings of the conference were devoted to various lectures and papers delivered in the lecture theatre of the Medical School, and an exhibition of laboratory work and apparatus was displayed. On Wednesday, August 27th, the conference visited Liverpool where Prof. W. Blair Bell gave a lecture on Laboratory Research in Cancer.

The conference dinner was held on August 28th. The principal guests were the Pro-Vice-Chancellor, Prof. A. E. Boycott, F.R.S., Dr. D. Stewart, Dr. W. Susman, and Dr. A. F. C. Davey. During the evening the Sims Woodhead Memorial Medals were presented to Prof. Boycott and Mr. W. A. Mitchell (Cambridge) for conspicuous service to the Association. Mr. A. Norman and Mr. J. McLean spoke of work done for the Association by the recipients, especially in the earlier days of the Association, when it was fundamental to the success of the movement that the sympathy of the laboratory chiefs should be obtained.

Prof. Boycott said that his position as Secretary of the Pathological Society of Great Britain and Ireland at the time the Association was formed had allowed him to dispel the fears of that Society that it was designed to usurp the Society's activities. The attendance at the conference showed how widespread is the organisation of the Association, members attending from Uganda, North and West Ireland, as well as from all parts of England and Scotland.

PSYCHOLOGY OF THE SMALL CHILD.

MOST of the problems in the life of children in the early school years are helpfully discussed in a small book [1] recently published which deserves attention. The volume is ambitious in scope. For example, the imaginal, intellectual, and creative life of children at the fifth year are subjected to long consideration, and even such difficult problems as the child's spiritual needs are discussed. Despite the scientific difficulties of this last topic, the authors have achieved some measure of success in this section. Various activities of the older child are then dealt with—physical, social, constructing, literary—and on each subject sound sense is offered in attractive language. The chapter on types of children is not quite so happy. Understanding of the maladjusted child cannot be obtained satisfactorily in the absence of an understanding of the unconscious operations of the mind. The authors should make a separate volume of this chapter.

[1] The Child from Five to Ten. By Evelyn and Miriam Kenwrick. London: Kegan Paul, Trench, Trübner and Co., Ltd. 1930. Pp. 299. 7s. 6d.

QUEEN CHARLOTTE'S MATERNITY HOSPITAL.—The annual report once more brings out the difference in the death-rate between "booked" and "emergency" cases. There were last year 2360 in-patients—1916 married women and 444 single women with their first child. The death-rate for "booked" cases was 3·2, and for "emergency" cases 43 per 1000; the infantile death-rate in the former category was only 25 per 1000 as compared with 153 in the latter. The number of women attended in their own homes was 1546, and for the third year in succession there were no maternal deaths. The first patients were received into the new isolation block at Hammersmith last week.

Medical Diary

LECTURES, ADDRESSES, DEMONSTRATIONS, &c

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, Sept. 15th, to SATURDAY, Sept. 20th.—WESTMINSTER HOSPITAL, S.W. Post-graduate Course in Medicine, Surgery, and the Special Departments, occupying each day from 10.30 A.M. to 5.30 P.M., with lectures and demonstrations. Men only. Fee £5 5s. Copies of syllabuses for forthcoming courses may be obtained from the Fellowship of Medicine, 1, Wimpole-street, W.1.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.

MONDAY, Sept. 15th.—2.30 to 5 P.M.: Medical, Surgical, and Gynæcological Clinics. Operations.

TUESDAY.—2.30 to 5 P.M.: Medical, Surgical, Ear, Nose, and Throat Clinics. Operations.

WEDNESDAY.—2.30 to 5 P.M.: Medical, Skin, and Eye Clinics. Operations.

THURSDAY.—11.30 A.M.: Dental Clinics. 2.30 to 5 P.M.: Medical, Surgical, Throat, and Ear Clinics. Operations.

FRIDAY.—10.30 A.M.: Ear, Nose, and Throat Clinics. 2.30 to 5 P.M.: Medical, Surgical, and Children's Diseases Clinics. Operations.

Appointments

ADAMS, J. R., M.B. Edin., D.P.H., has been appointed County Medical Officer for Roxburgh.

BACH, FRANCIS, D.M. Oxf., Medical Registrar to the British Red Cross Society's Clinic for Rheumatism, Peto-place, London.

BROWNLIE, J. L., M.D. Glasg., D.P.H., a Medical Officer of the Department of Health for Scotland.

GREGORY, J. C., M.R.C.S., L.R.C.P., House Physician to Medical Unit, University College Hospital, London.

JACK, James, *M.C.*, M.B. Glasg., Medical Officer of Health for the city of Durham.

SHARP, C. J. H., to be Certifying Surgeon under the Factory and Workshop Acts for the Linslade District of the County of Buckingham.

STEPHENSON, H. M., to be Certifying Surgeon under the Factory and Workshop Acts for the Maiden Newton District of the County of Dorset.

TOPPING, ANDREW, M.D. Aberd., D.P.H., Medical Officer of Health for Rochdale.

Births, Marriages, and Deaths

BIRTHS.

CHAMBERS.—On Sept. 6th, in London, the wife of Guy Chambers, F.R.C.S. Eng., of Ryde, and Bolton-gardens, S.W., of a son.

COLE.—On Sept. 5th, at Trumpington-street, Cambridge, the wife of Leslie Barrett Cole, M.D. Camb., M.R.C.P. Lond., of a son.

DANBY.—On Sept. 7th, 1930, to Victoria (née Arkell), wife of Alfred Danby, F.R.C.S.E., at the Homestead, Woodbourne-road, Birmingham—a daughter.

GLADSTONE.—On Sept. 5th, at The Old House, Rendcomb, Cirencester, the wife of F. C. Gladstone, D.M. Oxf., of a son.

KEYS.—On Sept. 1st, at Ravello, Ruislip, the wife of Sidney Hudson Keys, M.R.C.S. Eng., L.R.C.P. Lond., of a son.

MILLER.—On Sept. 1st, at Grosvenor-road, Tunbridge Wells, the wife of T. Mackinlay Miller, M.R.C.S., L.R.C.P. Lond., of a son.

MONCRIEFF.—On Sept. 2nd, Honor (née Wedmore), wife of Alan Moncrieff, M.D., M.R.C.P., of a son.

MARRIAGES.

BASSETT—BURRELL.—On Sept. 3rd, at St. Paul's Church, Edinburgh, John Mories Bassett, M.D., F.R.C.S. Edin., only son of W. Bassett, Christchurch, New Zealand, to Kathleen Alicia, eldest daughter of the late H. M. Burrell, Edinburgh.

PEEL—MONYPENY.—On Sept. 2nd, at Fisherwick, Presbyterian Church, Belfast, Albert A. Fitzgerald Peel, M.A., D.M. Oxf., son of Dr. A. A. Peel of Glasgow, and Crumlin, Co. Antrim, to Mary Watson Monypeny, M.Sc., daughter of the late Dr. William Monypeny of Belfast.

DEATHS.

MARK.—On Sept. 5th, at Oxford-terrace, W., after a long illness, Leonard Portal Mark, M.D., son of the late Edward W. Mark, late Consul of Marseilles.

MUSGRAVE.—On Sept. 2nd, Cecil B. T. Musgrave, M.D. Lond., M.R.C.S. Eng., L.R.C.P. Lond., of Domain, Mullion, Cornwall, last surviving son of the late Colonel Musgrave, 5th Bengal Cavalry.

WALLACE.—On Sept. 5th, at Howard Lodge, Newport-road, Cardiff, Thomas Wallace, M.D.R.U.I., J.P.

WARREN.—On Sept. 2nd, following an operation, Alfred Castle Warren, M.D. Camb., L.R.C.P. Lond.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.